Miscellaneous Paper CERC-95-5
June 1995

**US Army Corps of Engineers**
Waterways Experiment Station

# Index and Bulk Parameters for Frequency-Direction Spectra Measured at CERC Field Research Facility, September 1993 to May 1994

*by Charles E. Long, Judy H. Roughton*






Prepared for Headquarters, U.S. Army Corps of Engineers

Miscellaneous Paper CERC-95-5
June 1995

# Index and Bulk Parameters for Frequency-Direction Spectra Measured at CERC Field Research Facility, September 1993 to May 1994

by Charles E. Long, Jody H. Roughton

U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

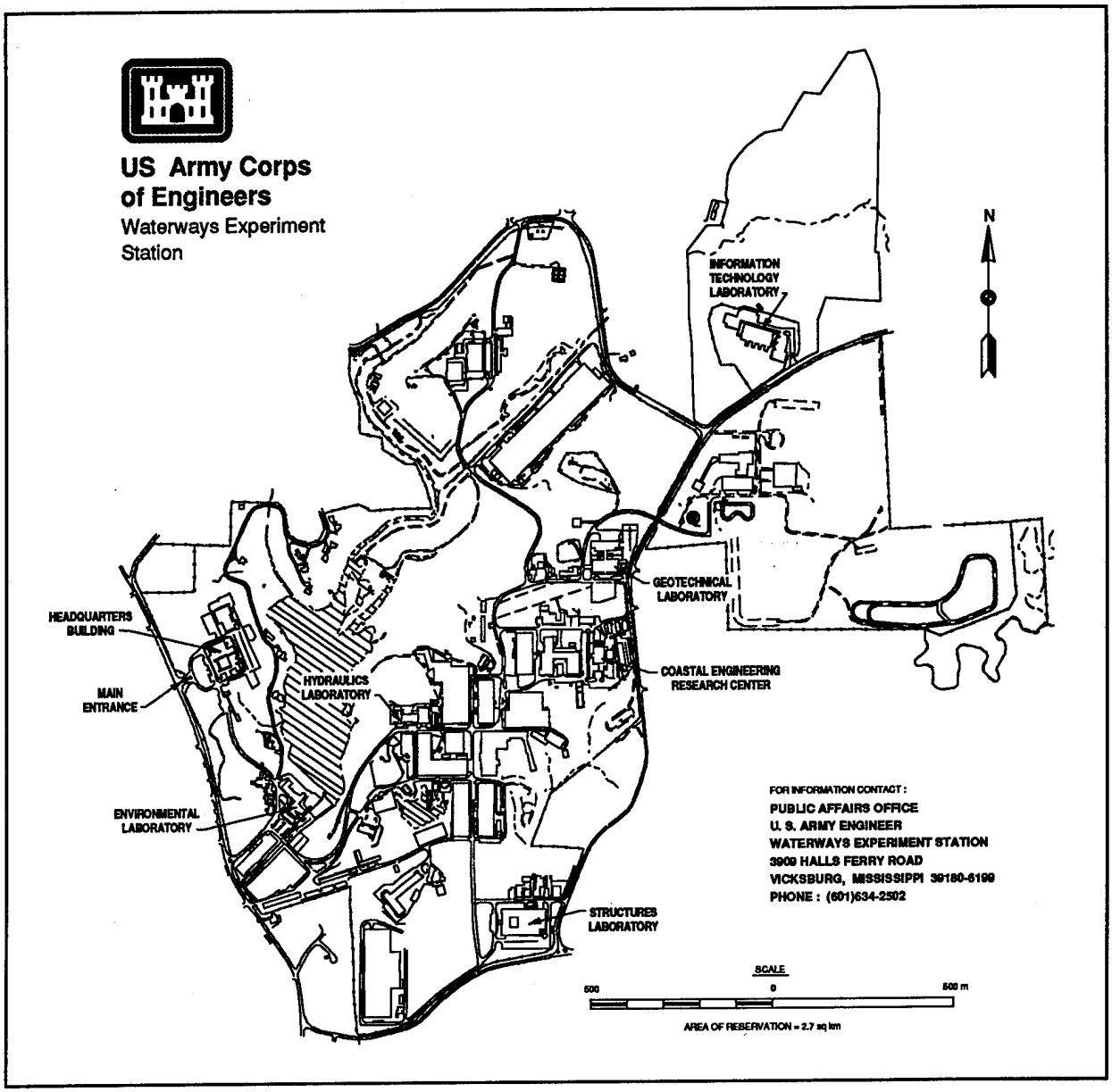


Final report

Approved for public release; distribution is unlimited

Prepared for U.S. Army Corps of Engineers
Washington, DC 20314-1000

Under Work Unit 32484




**Waterways Experiment Station Cataloging-in-Publication Data**

Long, Charles E.

Index and bulk parameters for frequency-direction spectra measured at CERC Field Research Facility, September 1993 to May 1994 / by Charles E. Long, Jody H. Roughton ; prepared for U.S. Army Corps of Engineers.

97 p. : ill. ; 28 cm. -- (Miscellaneous paper ; CERC-95-5)

Includes bibliographic references.

1. Ocean waves -- North Carolina -- Duck -- Statistics. 2. Wind waves -- North Carolina -- Duck -- Statistics. 3. Water waves -- North Carolina -- Duck -- Statistics. I. Roughton, Jody H. II. United States. Army. Corps of Engineer. III. U.S. Army Engineer Waterways Experiment Station. IV. Coastal Engineering Research Center (U.S. Army Engineer Waterways Experiment Station) V. Title. VI. Series: Miscellaneous paper (U.S. Army Engineer Waterways Experiment Station) ; CERC-95-5.

TA7 W34m no.CERC-95-5

# Contents


Preface . . . . . iv

1—Introduction . . . . . 1

2—Field Research Facility . . . . . 3

Bathymetry . . . . . 3
Wave-Generating Winds . . . . . 3

3—Instrumentation . . . . . 6

4—Data Collection . . . . . 9

5—Data Processing . . . . . 10

Error Checking . . . . . 10
Frequency-Direction Spectra . . . . . 13
Bulk Parameters . . . . . 18

6—Archived Results . . . . . 26

7—Retrieving Processed Data . . . . . 28

8—Summary of Results . . . . . 30

References . . . . . 31

Appendix A: Table of Collection Times and Bulk Parameters . . . . . A1

Appendix B: Time Series Graphs of Bulk Parameters . . . . . B1

Appendix C: Listing of FORTRAN Computer Program . . . . . C1

Appendix D: Listing of Sample Data File . . . . . D1

Appendix E: Notation . . . . . E1

SF 298

# Preface

This report indexes parameters of and describes means of access to a series of frequency-direction spectral observations made with a 16-element, high-resolution directional wave gauge at the Field Research Facility (FRF) of the U.S. Army Engineer Waterways Experiment Station (WES). The work was motivated by a paucity of observations of directionally distributed wave energy, which has hindered understanding and modeling of the nearshore processes that affect coastal engineering projects. This effort was authorized by Headquarters, U.S. Army Corps of Engineers (HQUSACE), under Civil Works Coastal Flooding Program Research Work Unit 32484, "Directionality of Waves in Shallow Water." Funds were provided through the Coastal Engineering Research Center (CERC), WES, under the program management of Ms. Carolyn M. Holmes, CERC. Messrs. John H. Lockhart, Jr., Charles Chesnutt, Barry W. Holliday, and John F. C. Sanda were HQUSACE Technical Monitors.

This summary report was prepared by Dr. Charles E. Long using data processed and archived with help from Ms. Judy H. Roughton at the FRF site near Duck, NC. Work was performed under the direct supervision of Mr. William A. Birkemeier, Chief, FRF, and Mr. Thomas W. Richardson, Chief, Engineering Development Division, CERC; and under the general supervision of Dr. James R. Houston and Mr. Charles C. Calhoun, Jr., Director and Assistant Director, CERC, respectively.

The directional wave gauge and its data processing software were designed by Dr. Joan M. Oltman-Shay while at Oregon State University working through an Intergovernmental Personnel Agreement. The directional wave gauge was physically maintained with diver coordination by Messrs. Michael W. Leffler and C. Ray Townsend III, FRF, and logistical support by Mr. Brian L. Scarborough, FRF. Gauge calibration was maintained by Messrs. Kent K. Hathaway and Paul R. Hodges, FRF. Acquisition, monitoring, and storage of raw data were done by Mr. Clifford F. Baron, FRF.

At the time of publication of this report, Director of WES was Dr. Robert W. Whalin. Commander was COL Bruce K. Howard, EN.

# 1 Introduction

Wind waves are among the dominant forcing mechanisms in all coastal processes. Estimation of wave forces for engineering design requires knowledge of sea state, which is described, at a minimum, by an amplitude, a frequency, and a direction for each component of a wave field. Historically, there have been many observations of wave amplitude and frequency, but very few detailed observations of wave direction, due primarily to additional technical requirements in making such measurements. This represents a distinct and very important void in the knowledge required for comprehensive engineering design.

To begin to alleviate this dearth of knowledge, the Field Research Facility (FRF) of the U.S. Army Engineer Waterways Experiment Station, installed a high-resolution, directional wave gauge for long-term observations of the nearshore incident directional wave climate at its site near Duck, NC (Figure 1). The original gauge, consisting of an alongshore linear array of nine pressure gauges, was installed in September 1986. In September 1990, an additional six gauges with a cross-shore alignment were incorporated, making a fifteen-element, two-dimensional spatial array for estimating wave energy propagating in all directions.

Data thus obtained, which take the form of wave frequency-direction spectra, are intended for use by the broadest possible group of researchers and application engineers, and have been archived in a simple database. This report simplifies data dissemination by indexing and describing means of access to the set of observations collected from September 1993 to June 1994, part of the eighth year of deployment. Indexes for the first 7 years of deployment are reported by Long (1991a, 1991b), Long and Smith (1993, 1994), Long and Atmadja (1994), Long and Pemberton (1994), and Long and Roughton (1994).

The main text of this document describes and clarifies the substantial information contained in the appendixes. Brief overviews are given of the measurement site, instrumentation, data collection, and method of directional spectral estimation. These subjects are described in greater detail in other publications, to which the reader is referred. Following the overviews is a description of the archived frequency-direction spectra and some characterizing bulk parameters that can be derived from them. Appendix A is a listing of these characterizing parameters and is intended to be used as a catalog of

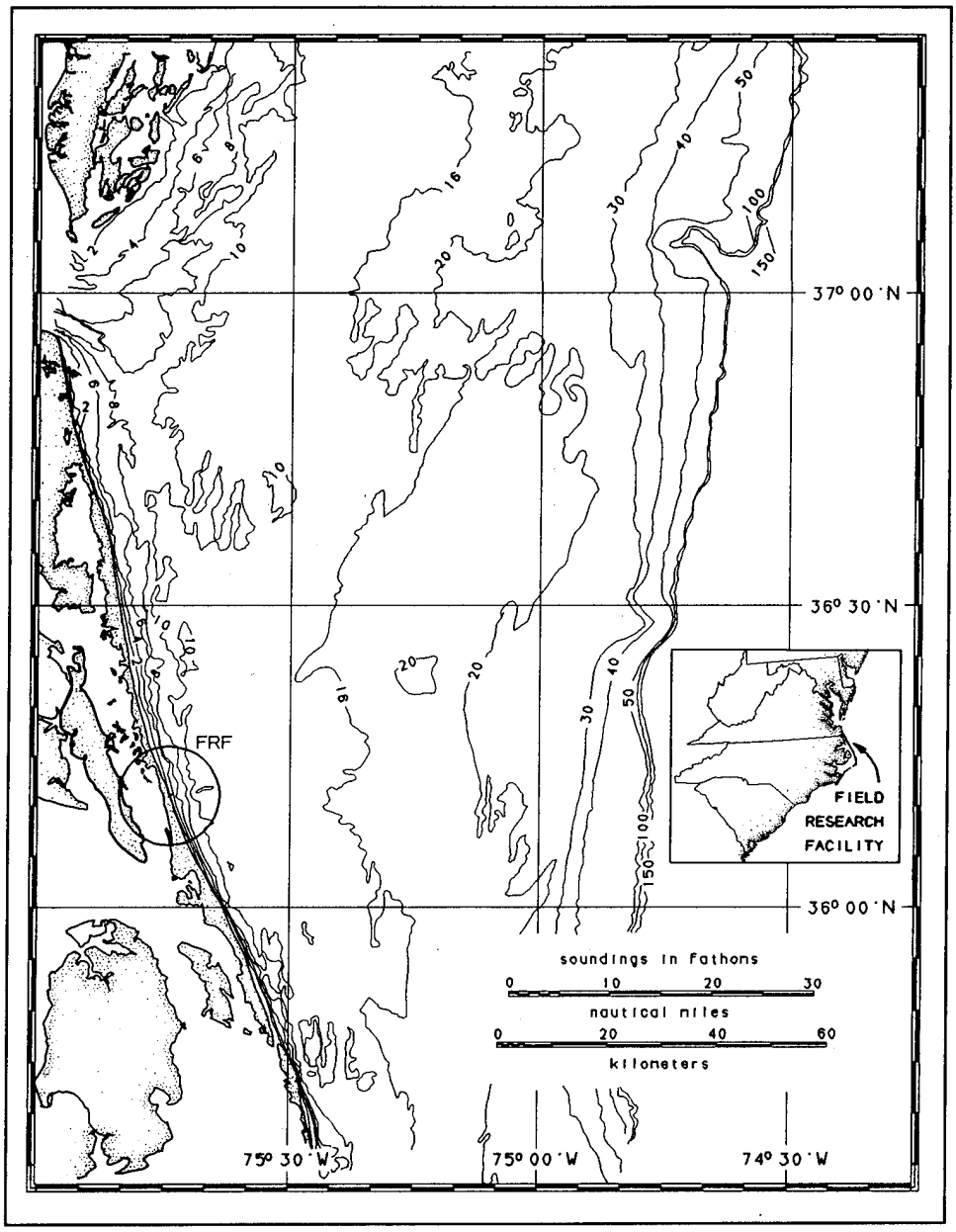



Figure 1. Location and offshore bathymetry of the FRF

the set of spectra. Appendix B contains graphs of time series of some of these parameters as a pictorial augmentation of the information in Appendix A. Appendix C illustrates a FORTRAN computer program that can be used to read archived data, of which a sample listing is given in Appendix D.

# 2 Field Research Facility

As shown in Figure 1, the FRF is located on the barrier island chain of coastal North Carolina. A detailed description of the layout, function, and capabilities of the FRF is given by Birkemeier et al. (1985). Of particular relevance to directional wave studies are the wave-steering bathymetry and wave-generating winds.

## Bathymetry

The coastline in the vicinity of the FRF is nearly straight for several tens of kilometers north and south (Figure 1). It is oriented such that a shore-normal line (directed seaward) is very nearly 70 deg from true north. Waves and onshore winds can approach this site along an easterly 180-deg arc from 340 to 160 deg true. The adjacent continental shelf is wide, relatively shallow, and of somewhat complex bathymetry. The direction of nearest approach of the 100-m (328-ft) isobath, which indicates the shelf break, is 10 to 15 deg south of east. On this azimuth, the shelf break is about 80 km (43 n.m.) distant. A typical bottom slope for the shelf is 0.001, but this is interrupted by numerous features of 1- to 10-km (0.5- to 5.4-n.m.) horizontal scales and 10-m (33-ft) vertical scales scattered irregularly across the shelf.

Within a few kilometers of the FRF, the offshore bathymetry is more regular, with isobaths nearly shore-parallel and a bottom slope of about 0.002 (Figure 2). Some irregularities exist. Within about 300 m (984 ft) of the shore, there exists a complex and mobile bar system (Birkemeier 1984) that is strongly influenced by nearshore waves and currents. These processes have also created some irregular bathymetry in the vicinity of the 600-m-long (1,970-ft-long) FRF research pier (Miller, Birkemeier, and DeWall 1983).

## Wave-Generating Winds

The site is subject to a variety of climates, which gives rise to a diverse set of directional wave conditions. Primary sources of high-energy waves are winds associated with hurricanes and frontal passages. Though no hurricanes passed directly over the FRF during the period covered by this report, one (Emily from 31 August to 1 September 1993) passed near enough that significant wave energy could be measured at the FRF. Unfortunately, the directional array of gauges was disabled for a major overhaul from 12 August to

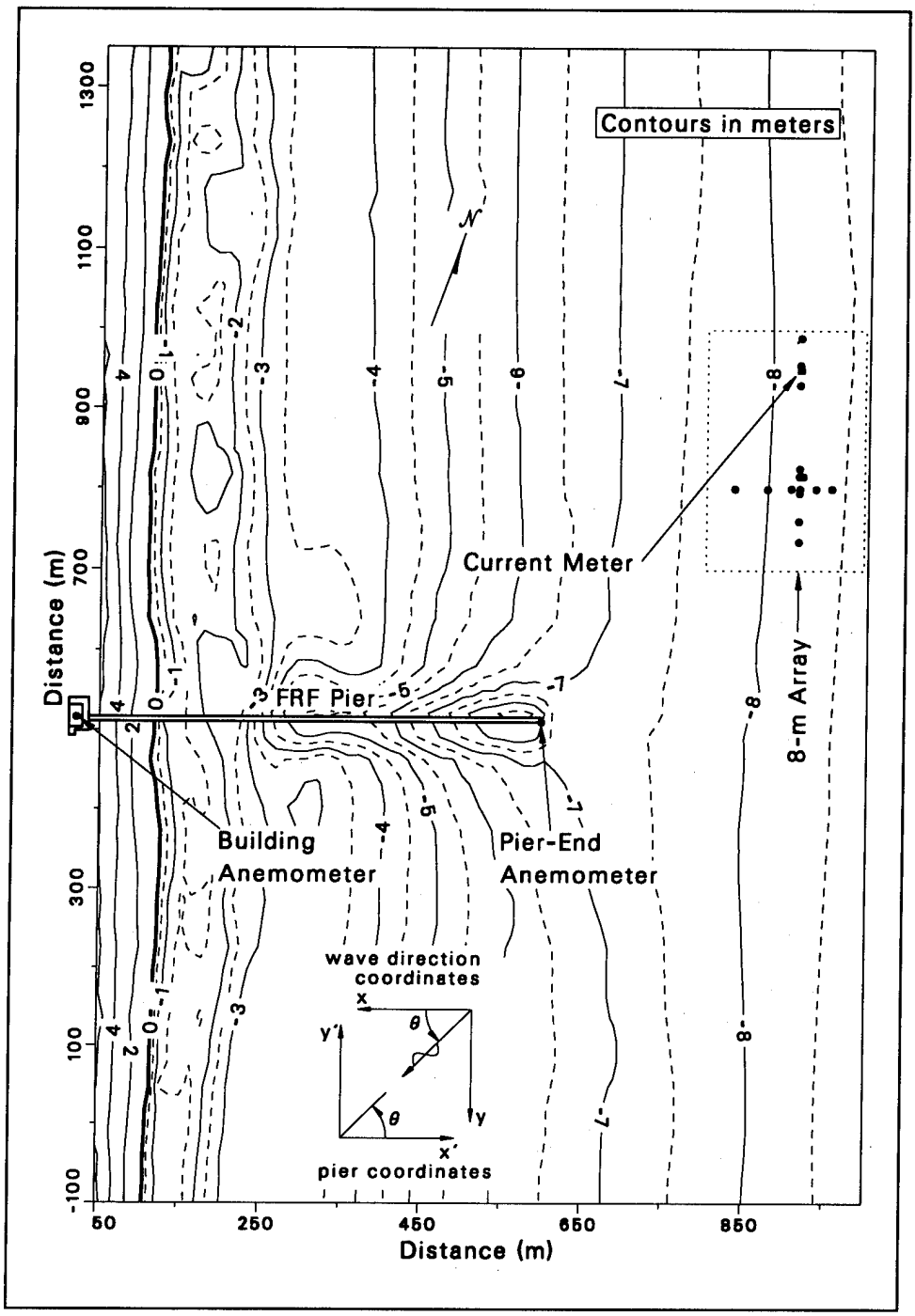



Figure 2. FRF nearshore bathymetry and coordinate system

23 September 1993, and so was not functioning during the passage of Hurricane Emily. Low-pressure weather fronts, of which several crossed the FRF site during this reporting period, were typically oriented northeast-southwest, with strong wave-generating winds coming from the northeast.

For additional information, the National Oceanic and Atmospheric Administration daily weather maps (U.S. Department of Commerce 1993, 1994)

contain large-scale depictions of weather systems passing the FRF site during this collection period. Detailed, quantitative descriptions of the climate at the FRF, as determined from its arsenal of instrumentation, are given in a series of annual reports, of which those by Leffler et al. (1992, 1993) are examples.

# 3 Instrumentation

The primary instrument in this study is a high-resolution directional wave gauge. It consists of two parts. The first is a spatial array of sensors that sample sea-surface displacement at several points in (horizontal) space. The second, described in the following section on data processing, is the mathematical treatment of these data to obtain estimates of wave directionality.

The FRF array consists of 15 pressure gauges mounted approximately 0.5 m (1.6 ft) off the bottom in the vicinity of the 8-m (26-ft) isobath about 900 m (2,953 ft) offshore and to the north of the research pier (Figure 2). Its location satisfies three constraints. First, it is generally outside the surf zone so that linear wave theory is applicable in data processing. Second, it is in water shallow enough that signals from 3-sec waves, the shortest periods of interest here, are detectable above background noise at the bottom-mounted gauges. Third, it is located away from the irregular isobaths around the pier and in the nearshore bar system, which helps minimize bathymetrically induced inhomogeneities in the wave field.

Spacing between gauges in the array appears irregular in Figure 2 but, for the most part, corresponds to the array-design criterion posed by Davis and Regier (1977) that every gauge pair has a unique separation. Figure 3 is an enlarged view of the array layout and shows gauge spacing as well as the gauge naming scheme. A sixteenth pressure gauge (labelled T) in Figure 3 is part of a low-resolution directional wave gauge that also includes the current meter indicated in Figure 2. Data from gauge T are included in error checking procedures, and were available as backup data in the event of failure of certain other gauges, but were not used as part of the high-resolution array during this collection period.

The array geometry encompasses considerable ranges in both sizes and numbers of gauge separations. Minimum gauge spacing is 5 m (16.4 ft) in both the alongshore and cross-shore directions. Maximum spacing is 255 m (837 ft) in the alongshore direction and 120 m (394 ft) in the cross-shore direction. Intermediate gauge spacings are in multiples of 5 m (16.4 ft). With 15 gauges, there are 105 possible unique spacings. In the FRF array, 12 redundant spacings are intentionally left for ancillary examination of spatial homogeneity of the wave field, so that 93 unique spacings remain.

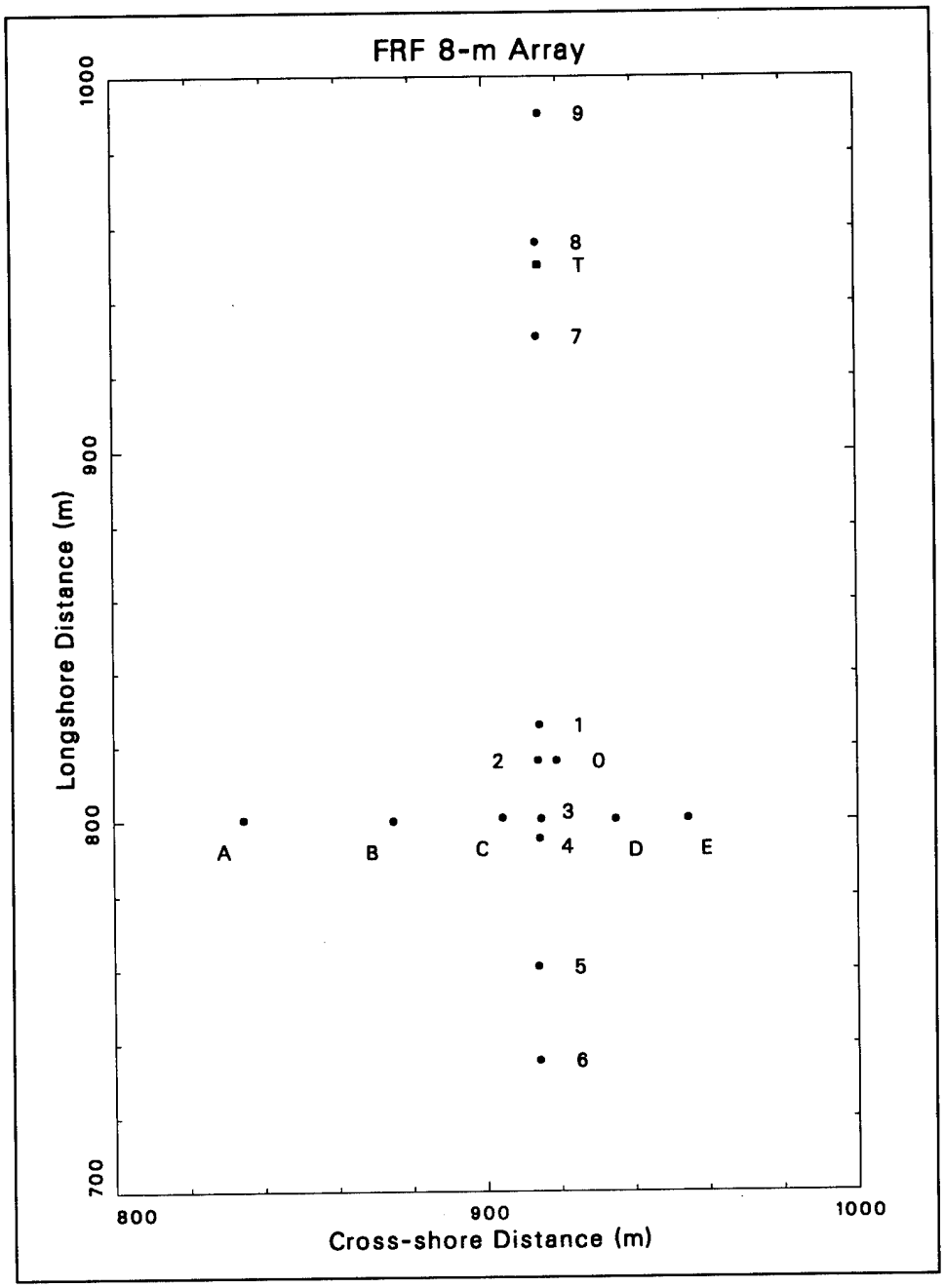



Figure 3. Spacing and numbering of linear array gauges

With the exception of gauge C, each pressure gauge is a Senso-Metric Model SP973(C), in which a piezo-electric strain gauge detects displacement of a pressure-sensitive diaphragm referenced to an evacuated cavity. Site calibrations indicate an accuracy of the pressure equivalent of $\pm 0.006$ m ($\pm 0.02$ ft) of water for wave-induced fluctuations about a static water column height of 8 m (26 ft). Gauge C is a Paroscientific Model 245AT resonating quartz absolute pressure transducer. The manufacturer's stated accuracy of this gauge is the pressure equivalent of $\pm 0.003$ m ($\pm 0.01$ ft) of water, which is about twice as accurate as the Senso-Metric gauges.

Voltage analogs of pressure signals are hard-wired through 10-Hz, fourth-order, Butterworth filters (primarily to eliminate 60-Hz noise) to an analog-to-digital signal converter, and then to a Digital Equipment Corporation VAXstation 4000 computer for data acquisition. Discretization of the full-scale signal to 11-bit binary form results in a digitization step of the equivalent of 0.007 m (0.023 ft) of water, which is nearly the same as gauge accuracy.

# 4 Data Collection

Signals from each of the pressure gauges were sampled at 2 Hz and stored digitally as records of 4,096 points (34 min 8 sec). A collection consisted of four such records, or 16,384 points (2 hr 16 min 32 sec) for each gauge. This procedure resulted in a total of 245,760 data points to produce one frequency-direction spectrum. Collections occurred eight times daily with starting times 0100, 0400, 0700, 1000, 1300, 1600, 1900 and 2200 hr Eastern Standard Time (EST). With this sampling pattern, the maximum possible number of collections is 2,920 in a 365-day year. Some collections are missed, however, because of necessary maintenance and repairs to the directional array and the data collection system.

During the 9-month period covered by this report, a total of 1,975 frequency-direction spectra (about 90 percent of the maximum possible) were obtained. A list of data collection start times for these observations is given in Appendix A. Appendix B contains time-series plots of spectral parameters with winds and currents as auxiliary environmental variables. Locations of reference anemometers and the current meter are shown in Figure 2. Note that wind vectors plotted in Appendix B are derived from the pier-end anemometer shown in Figure 2.

# 5 Data Processing

Conversion of measured time series to estimates of frequency-direction spectra requires products of frequency spectral estimates from the gauges in the array. For final results to be accurate, raw input data must be of exceptionally high quality so that spiky or drifty data from one gauge do not contaminate products of results from the other gauges. Hence, the procedure for data processing is to check raw data for errors before estimating frequency-direction spectra. Some bulk parameters can then be computed to characterize results.

## Error Checking

Because multiple gauges were deployed in what was assumed to be a uniform sea, certain statistical properties of raw data from each of the set of gauges should be identical. One such property is the frequency spectrum $S(f)$ (where $f$ is frequency)[1] of raw (not surface-corrected) pressure signals. Under the ideal circumstances of constant water depth, uniform gauge elevation from the bottom, and no statistical noise, frequency spectra from all gauges are identical in every detail. Though these circumstances are not met exactly in the FRF system, they are approximated sufficiently closely that an intercomparison of the frequency spectra from the array of gauges is an excellent method for identifying erroneous data records.

A convenient way to effect such an intercomparison is to overplot frequency spectra from all the gauges on a single graph. Wind wave signals attenuate with depth so that, in accordance with linearized wave theory, very little direct wind wave energy is expected in the frequency range from about 0.4 Hz out to the sampling Nyquist frequency (1.0 Hz for normal FRF sampling). Spectra in this frequency band should primarily indicate system noise, which should be about the same for all gauges of like kind, and consistent in time for all gauges. Excessively spiky data from one gauge appears as an increased noise level relative to other gauges. Strong low-frequency drifts in data from one gauge appear either as deviations in the low-frequency part of the spectrum or as varying mean values from segment to segment through a data record. In the pass band of wind wave frequencies for which directional

[1] For convenience, symbols and abbreviations are listed in the notation (Appendix E).

estimates are computed (0.04 to 0.32 Hz for these data), one expects the frequency spectra to be nearly identical. A malfunctioning gauge is clearly identifiable in this type of intercomparison.

Figure 4 is an example of one set of overplotted frequency spectra. Semi-logarithmic coordinates have been used to emphasize the behavior of the low-energy, high-frequency spectral tails. All pressure gauge signals have been converted to equivalent heights of a static water column for convenience in interpretation. As can be seen in Figure 4, spectra in the wind wave frequency pass band are very nearly alike, indicating that all gauges are functioning reasonably well. The noise floor at high frequencies is very low relative to the wind wave signal and is nearly uniform for all but two gauges. The two exceptions are the spare gauge (gauge T in Figure 3), for which the signal followed (at the time of the collection shown) a slightly different and intrinsically noisier electronic path to the data collection computer, and the Paroscientific gauge (gauge C in Figure 3), which had an inherently quieter background noise level than that of the other gauges.

The inset graph in Figure 4 reveals information about gauge mean values. Data records were divided into 15 half-overlapping segments having a duration of 17 min 4 sec. Segment mean values were then computed for each gauge. Ideally, when gauge means are corrected for the depth of water in which they were deployed and for the elevation of the gauge from the ocean bottom, they would all give a measure of mean water level (tidal elevation, barometric overpressure, and any wind- or wave-induced setup), which should be the same for all locations in the array for that segment of time. Experience has shown that the Senso-Metric gauges used in the array tend to have a modest mean drift over time scales of months. For the analysis used to produce this report, an estimate of true water depth was computed by finding the median of the set of corrected gauge means for each segment. The inset in Figure 4 shows the deviation of individual gauge means from this median value as a function of segment number, and indicates, for this example, mean depth errors ranging from about 0.15 m (0.49 ft) low to about 0.15 m (0.49 ft) high. By referencing all gauges to the median mean depth, potential errors in surface correcting the wind wave part of the signal are reduced.

The triangular symbol in the inset in Figure 4 shows the deviation of the median mean depth from still-water level (based on the 1929 National Geodetic Vertical Datum) as a function of segment number. The resulting curve represents the combined effects of tide, setup, and barometric overpressure. The square symbol in the inset in Figure 4 is the deviation of barometric pressure from one standard atmosphere in units of meters of sea water as a function of segment number. This curve indicates the magnitude of atmospheric pressure on pressure measurements of mean water level. This effect is removed from pressure gauge means by subtracting the excess of atmospheric pressure over one standard atmosphere from each of the gauge means.

It is noted that the present method of error checking is different from that used for results reported for the first 4 years of array analysis (Long 1991a, 1991b; Long and Smith 1993, 1994). The older method relied on moments

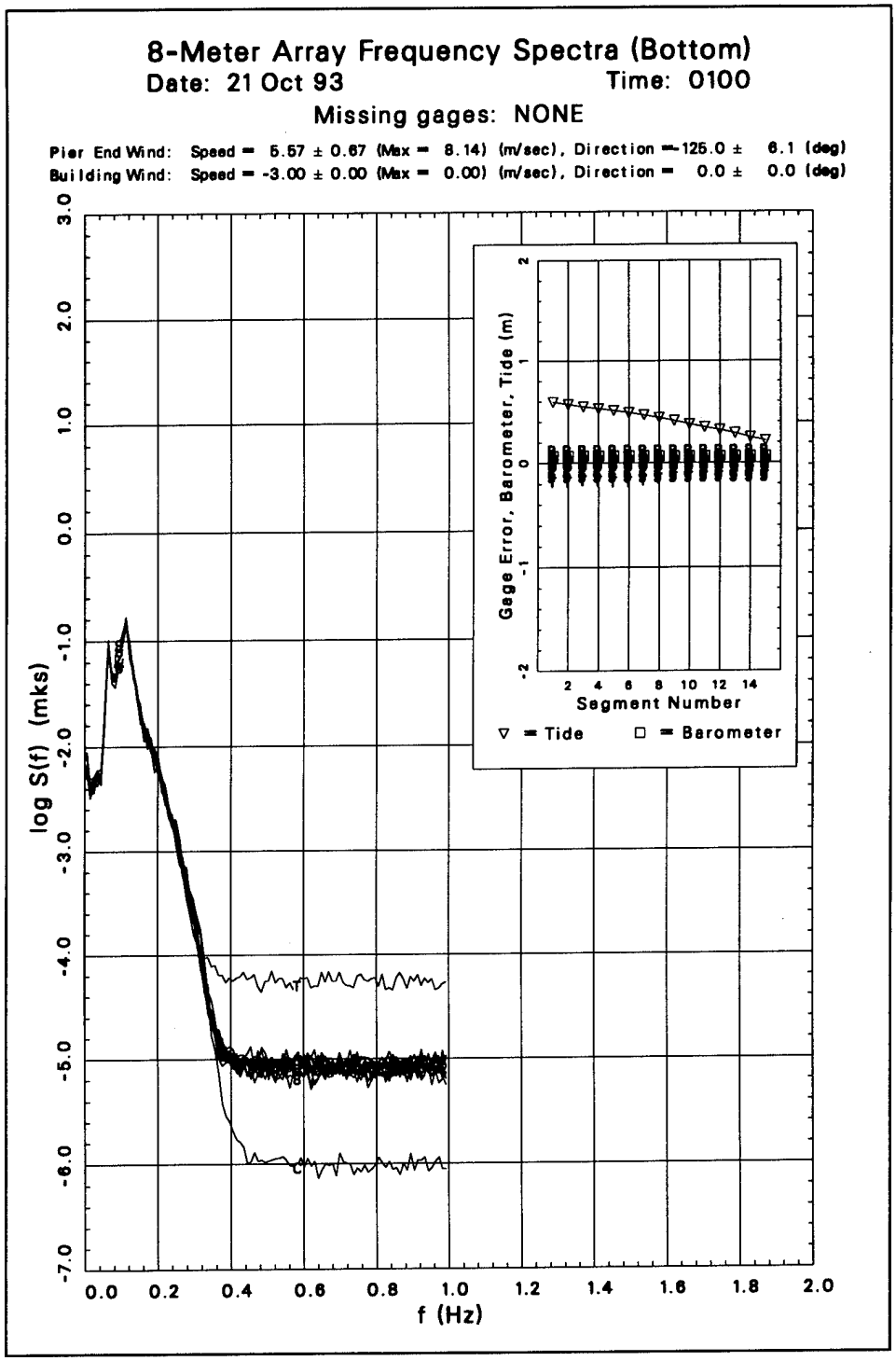



Figure 4. Example of overplotted frequency spectra

and extremal characteristics derived from data time series in the time domain. The present method casts the data in the frequency domain, but is sensitive to the same underlying characteristics that would flag data as suspect in the older method, and is much easier to use. In both methods, if a gauge demonstrated properties that deviated too much from properties of the other gauges, it was

flagged as being suspect, and the data were then further examined by hand to ensure that the flagging procedure had indeed identified a malfunctioning gauge.

If a gauge malfunctioned, it was not used in further analysis. The analysis programs were written so that data from a subset of gauges could be analyzed. A few gauges could then be lost without seriously compromising the results. Using fewer gauges yields a somewhat reduced directional resolution. Some gauges are more critical than others. If any of the gauge pairs with 5-m (16.4-ft) spacings are lost, results become invalid at high frequencies due to aliasing. In these cases, directional analysis was truncated at a lower high-frequency limit (generally 0.24 Hz instead of the normal 0.32 Hz). As discussed in the next section, there are additional reasons for eliminating gauges from directional wave estimation at some frequencies in a spectrum. However, fewer than four gauges are never used for any frequency.

To keep track of the set of functioning and not otherwise eliminated gauges, a parameter called the *gauge pattern* was created and stored with the results for each frequency in archived directional spectra. The gauge pattern is a 16-place character string that represents which of the possible gauges (the 15 array gauges plus the optional gauge T) were used to compute a directional spectrum at a particular frequency. The string contains the identifying characters (based on the gauge identification scheme shown in Figure 3) of gauges that were used in analysis followed by blank characters (if any) to fill out the string. This parameter can be of use in later analyses for assessing the directional resolving ability of a particular sub-array of gauges. This definition of gauge pattern differs from that used for the first 4 years of archived data, but the automated analysis algorithm was modified in September 1990 to be more dynamic in gauge selection (as described in the next section), and so necessitated this change.

## Frequency-Direction Spectra

### Two types of spectra

Data from the array of gauges are processed as two separate entities, both of which are frequency-direction spectra, but having different properties. One of the entities is a frequency-direction spectrum using only the original nine gauges (gauges 1, 2, 3, 4, 5, 6, 7, 8, and 9 in Figure 3) of the alongshore linear array. Directional spectra from this set of gauges are referred to as *linear array* results. The other entity is a frequency-direction spectrum using all gauges. Directional spectral estimates using all gauges are called *8-m array* or *full array* results.

There are several reasons for this distinction. One is that the database for the first 4 years of this study is based on results from the linear array. Comparisons of results over the full duration of the study and the accumulation of climatological statistics require a continued analysis of the linear array as a unique entity. A shortcoming of the linear array is that it cannot distinguish seaward-propagating waves from incident waves. In processing linear array

data, it must be assumed that all wave energy is incident, which does not allow for the possibility of reflections from the nearshore. This problem is overcome by using the full array, which includes gauges at cross-shore locations (gauges 0, A, B, C, D, and E in Figure 3) off the line of the linear array. The full array can detect wave energy propagating in all directions, and so can be used to estimate the amount of wave energy reflected (and otherwise propagating) from the nearshore.

Ideally, the full array would be adequate for all directional spectral estimates. However, the analysis algorithm for the full array is based on the assumption that waves are propagating through water of constant depth. In fact, the depth changes by about 0.8 m (2.6 ft) over the cross-shore breadth of the array (from gauge E to gauge A), or roughly 10 percent of the total depth. Intermediate- and shallow-water waves transform, largely by refraction, as they propagate through water of changing depth. This transformation introduces a slight shift in the phase difference between waves at two cross-shore locations relative to the phase difference of waves that are not transformed. Directional spectral estimates depend critically on accurate estimates of phase difference, and the effect of transforming waves, though slight, is to introduce an increased spread in the directional distribution of wave energy, especially for waves at high angles of attack. An optical analogy is a camera with a poorly ground lens that will focus clearly at the center but is slightly blurred at the edges.

The linear array does not have this blurring effect because waves have the proper phase difference as they cross a line of constant depth. Consequently, directional spectral estimates from the linear array are better resolved in their detailed structure. Because of this better resolution, linear array results are used for all characterizing parameters except reflection coefficients in this report. Though full array results are somewhat blurred, reflection coefficients are based on total energy in 180-deg arcs of direction, and so are less sensitive to a lack of detailed resolution than are other parameters like peak direction and directional spread. Note, however, that both linear array and full array spectra and associated parameters are computed, archived, and available through the mechanisms described in this report for all collections listed in Appendix A.

### Spectral estimation

Estimation of the frequency-direction spectrum is done in five parts. First, a working gauge set is identified. Second, time series of pressure data from each of the working gauges are Fourier transformed to the frequency domain. Third, these transforms are converted to sea-surface displacement transforms. Fourth, cross spectra of sea-surface displacement are computed between all unique gauge pairs for each frequency. Finally, an estimate is made of a directional distribution of wave energy that corresponds to the computed spatial variation in cross-spectral density for each frequency.

The choice of gauges to be used in a frequency-direction spectrum at a particular frequency depends on available gauges after error checking

(described previously), the wavelengths of the waves to be resolved, and somewhat on the nature of the directional distribution of wave energy being estimated. Ocean wave signals at a given frequency tend to become uncorrelated over distances of a few wavelengths. Cross spectra of signals from two gauges of high-frequency (short wavelength) waves are reduced to noise if the gauge separation is too great. Conversely, cross spectra of signals from two closely spaced gauges do not yield a great deal of information about very long waves because the two signals are almost identical. Because of these characteristics of ocean waves, sub-arrays of both the linear and 8-m arrays are defined so that minimum gauge spacing and maximum array extent are tuned to ranges of wind wave frequencies, and directional spectra are estimated from the gauges in these sub-arrays.

An additional constraint on gauge usage is based on the observation by Davis and Regier (1977) that occasionally the directional spectrum is of sufficiently simple shape that some of the cross-spectral information becomes redundant, meaning that too many gauges (or, perhaps, gauges in less than ideal locations) have been employed in the directional estimate. An indication of this condition is that the matrix of cross-spectral estimates becomes singular in the mathematical sense. When this occurs in the course of a computation, the procedure is to eliminate a gauge from the sub-array being used, and restart the computation. To avoid eliminating a critical gauge, an order for gauge elimination was established that retained gauges known to be important. Because this procedure occurred in automated processing, a complete gauge elimination pattern was defined, but if fewer than four gauges remained at any point in processing, the entire analysis was aborted for that collection.

Table 1 shows the wind wave frequency band sub-ranges, the sub-array of gauges to be used with each frequency sub-range, and the elimination order of gauges in each sub-array for the gauges of the linear array. A column under a gauge number that contains an integer indicates a gauge to be used for the frequency range shown in the left column. The integers in each row indicate the order in which gauges are to be eliminated. For example, in the next-to-highest frequency range of the original array ($0.14 < f \leq 0.19$ in Table 1), gauges 1, 2, 3, 4, 5, and 6 define the sub-array. In the event that a gauge

**Table 1**
**Linear Array Gauge Usage**

| Frequency Range (Hz) | Gauge | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | T |
| $0.04 < f \leq 0.08$ | 5 | 1 | | 7 | 4 | 6 | 8 | 2 | 3 | |
| $0.08 < f \leq 0.14$ | 5 | 2 | 1 | 6 | 4 | 7 | 3 | | | |
| $0.14 < f \leq 0.19$ | 5 | 6 | 1 | 4 | 3 | 2 | | | | |
| $0.19 < f \leq 0.32$ | 2 | 3 | 4 | 5 | 1 | | | | | |

must be eliminated, gauge 3 is eliminated first. If a second gauge must be eliminated, it is gauge 6, and so on, until the four-gauge limit is reached (if necessary). Table 2 shows the same type of information for the full array.

Because gauge set definition varies with frequency, and is somewhat data-adaptive in that some spectra require gauge elimination and others do not, it is important that a record be kept of the set of gauges used for each frequency in a collection analysis. That is the primary purpose of the gauge pattern parameter defined previously. The gauge pattern parameter is always kept with the archived results, and the limit of a minimum of four gauges for each directional estimate is never violated. Once the appropriate set of gauges has been identified, the subsequent analysis operations of Fourier transformation, surface correction, cross-spectral computation, and directional spectral estimation can proceed.

The Fourier transform is conventional. An 8,192-sec time series is divided into 15 half-overlapping segments of 1,024 sec. Segments are tapered with a

**Table 2**
**8-m Array Gauge Usage**

| Frequency Range (Hz) | Gauge | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | A | B | C | D | E | T |
| $0.04 < f \leq 0.08$ | 1 | 11 | | | 12 | 8 | 6 | 5 | 2 | | 9 | 10 | 7 | 4 | 3 | |
| $0.08 < f \leq 0.12$ | 5 | 7 | | | 10 | 11 | 2 | 1 | | | 3 | 6 | 8 | 9 | 4 | |
| $0.12 < f \leq 0.21$ | 7 | 10 | 11 | 6 | 3 | 1 | | | | 8 | | 4 | 9 | 5 | 2 | |
| $0.21 < f \leq 0.32$ | 3 | 5 | 7 | 6 | | | | | | 4 | | | 2 | 1 | | |

Kaiser-Bessel window (a modified Bessel function of the first kind, compensated uniformly for loss of variance due to windowing) and fast Fourier transformed. An intermediate-resolution transform is found by averaging the 15 transformed segments, frequency by frequency. Final transforms are found by then averaging results over 10 adjacent frequency bands. Final resolution bandwidth is 0.00976 Hz, and degrees of freedom are at least 150 (assuming eight contiguous segments and ignoring any gain from lapped segments). Transform estimates are retained for 29 frequency bands with band-center frequencies ranging from 0.044 to 0.318 Hz.

Conversion of pressure signals at depth to water-surface displacement is done through the linearized wave theory pressure response factor as described in the *Shore Protection Manual* (1984). After this conversion, complex cross spectra in the form of coincident and quadrature spectra are computed in the conventional way (Bendat and Piersol 1971, Jenkins and Watts 1968) between all unique gauge pairs for each frequency.

Conversion of cross-spectral patterns in lag space to directional spectra is done with the Iterative Maximum Likelihood Estimation algorithm derived and described by Pawka (1982, 1983). The algorithm is also described in application to data from heave-pitch-roll buoys by Oltman-Shay and Guza (1984), and Long (in preparation) gives a modestly expanded description of the algorithm for two-dimensional spatial arrays. Accuracy of directional estimates depends on frequency, with high-frequency waves (short wavelengths) being better resolved by an array of finite length. Tests with artificial data indicate that the FRF linear array generally can resolve the direction of a unidirectional wave train to within 5 deg and can distinguish two wave trains at the same frequency if their directions differ by at least 15 deg.

The algorithm used here employs discrete direction "bandwidths" or arcs of about 1 deg for all frequencies. Because this increment is finer than the resolution of any of the arrays, directional results were integrated over 2-deg arcs and renormalized with this arc width to create evenly spaced directional spectra at all frequencies. Because linear array results are valid only in the 180-deg arc representing seaward approach directions, dividing this range into 2-deg arcs results in 91 arc center directions with which to characterize discretely the directional distribution of wave energy from the linear array. The full array can detect wave energy from all directions, so results are represented in 181 directional bins of 2-deg width (the terminal bins are redundant).

The primary result of data processing is an estimate of the discrete frequency-direction spectrum $S(f_n, \theta_m)$, which represents the variance of sea-surface displacement per frequency resolution bandwidth $df$ (= 0.00976 Hz) per direction resolution arc $d\theta$ (= 2 deg), where $f_n$ is the $n^{th}$ of $N$ = 29 discrete frequencies and $\theta_m$ is the $m^{th}$ of $M$ = 91 (for the linear array) or 181 (for the full array) discrete directions. In this work, direction is considered to be the angle from which wave energy is coming, measured counterclockwise from shore-normal (Figure 2).

Numerical values of $S(f_n, \theta_m)$ can range over many orders of magnitude, depending on the amount of energy in a given frequency band and direction arc, and this can require space-consuming formats for archiving data. To simplify this problem, frequency-direction spectra are saved as directional distribution functions $D(f_n, \theta_m)$ defined by

$$D(f_n, \theta_m) = \frac{S(f_n, \theta_m)}{S(f_n)} \qquad (1)$$

The directional distribution function has units of $deg^{-1}$, and its integral with respect to direction over all directions is unity.

The frequency spectrum $S(f_n)$ in Equation 1 represents the sum over all directions of sea-surface variance per frequency bandwidth and is defined in terms of the frequency-direction spectrum by

$$S(f_n) = \sum_{m=1}^{M} S(f_n, \theta_m)\, d\theta \tag{2}$$

where the variables on the right-hand side are defined above. Note that this is identical to a conventional frequency spectrum that would result from a time series of sea-surface displacements at a single point in space. Because it is an integral of the frequency-direction spectrum, it is called the integrated frequency spectrum.

A directional analog of the frequency spectrum is the integrated direction spectrum, found by summing the frequency-direction spectrum over all frequencies for a fixed-direction arc. It is computed from

$$S(\theta_m) = \sum_{n=1}^{N} S(f_n, \theta_m)\, df \tag{3}$$

Figures 5 and 6 show ways to display frequency-direction spectra and the corresponding integrated frequency and integrated direction spectra from the two types of array analysis for the same collection time. Figure 5 displays results from the linear array, with some characterizing parameters shown in the figure header. Note that energy is displayed only for incident waves ($-90$ deg $< \theta_m <$ 90 deg). Figure 6 shows results from the full array. The characterizing parameters derived from this spectral estimate are nearly the same as those for the linear array results in Figure 5, showing that the two estimates are consistent in this regard, as expected. In Figure 6, directional energy estimates cover a complete circle. The small lump centered near direction -170 deg, and spreading across -180 deg (or +180 deg) is an indication of reflected energy.

## Bulk Parameters

Several parameters have been computed to characterize the observed spectra. There are five basic types of parameters: (a) characteristic wave height, (b) peak frequency (or its inverse, peak period), (c) peak direction, (d) directional spread, and (e) reflection coefficient. In this report, the first four of these parameters are computed from linear array results. The fifth is computed using results from the full array. Because there is more than one way to define some of these parameters, several alternate forms are presented here.

### Characteristic wave height

Characteristic wave heights from spectral observations are most frequently given as $H_{mo}$, which is four times the standard deviation of sea-surface displacement. It can be determined from the volume under the frequency-direction spectrum by the equation

$$H_{mo}^2 = 16 \sum_{n=1}^{N} \sum_{m=1}^{M} S(f_n, \theta_m)\, df\, d\theta \tag{4}$$

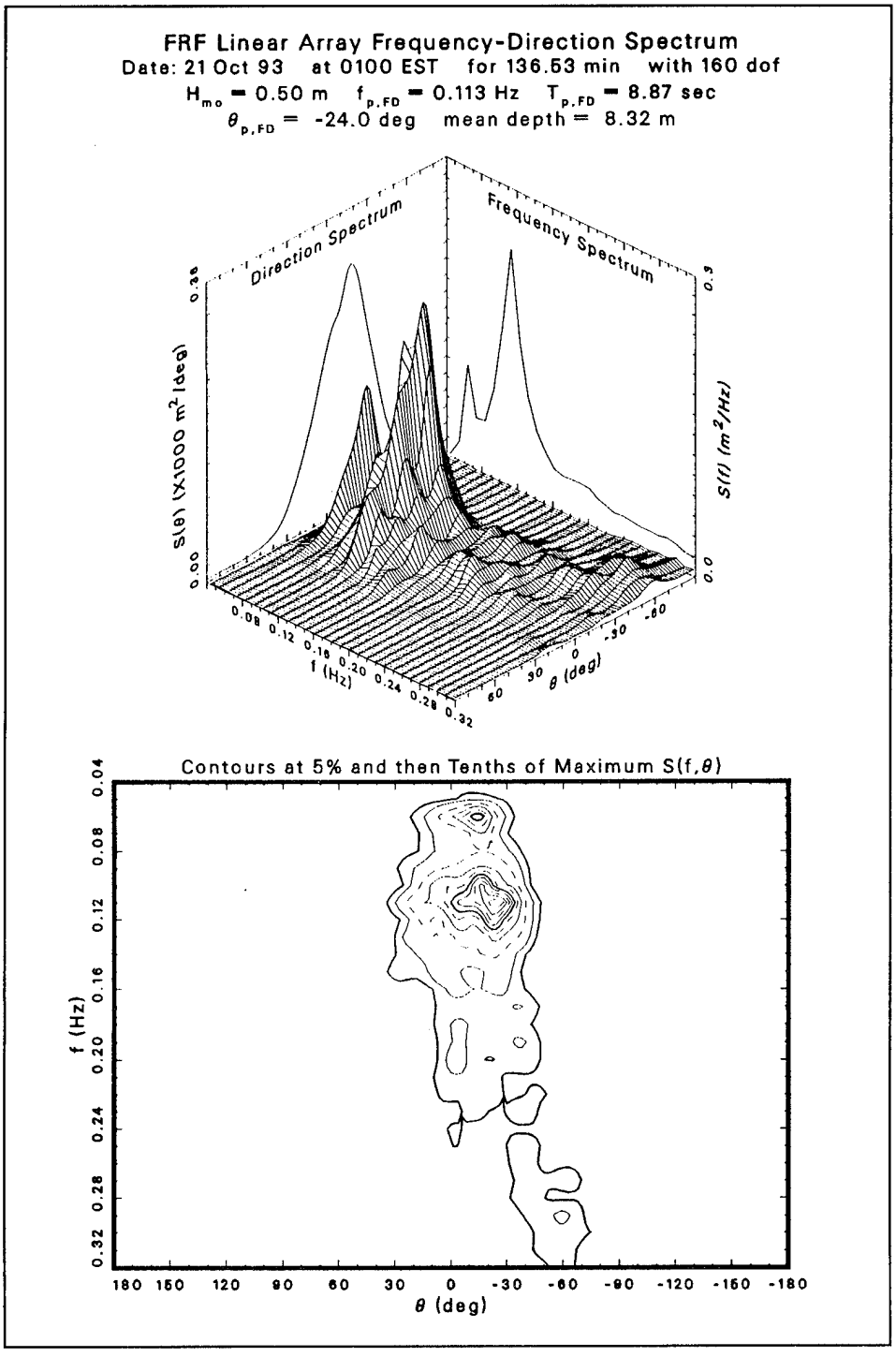



Figure 5. Example of a linear-array frequency-direction spectrum

It can also be found from the integrated frequency spectrum by

$$H_{mo}^2 = 16 \sum_{n=1}^{N} S(f_n)\, df \tag{5}$$

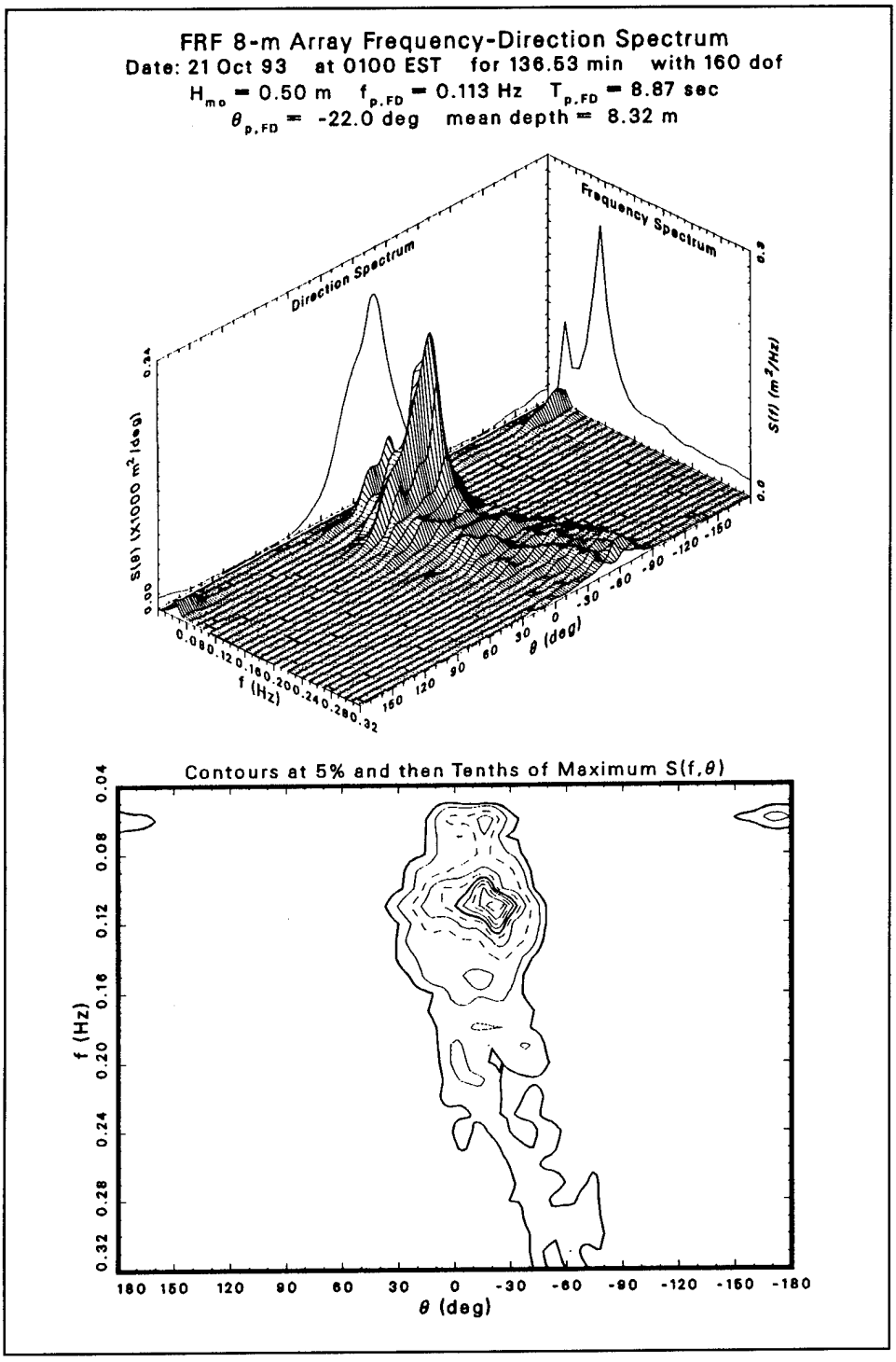



Figure 6. Example of a full-array frequency-direction spectrum

which is its more conventional definition, or from the integrated direction spectrum (Equation 3) by

$$H_{mo}^2 = 16 \sum_{m=1}^{M} S(\theta_m)\, d\theta \qquad (6)$$

### Peak frequency

Peak frequency, which has the generic notation $f_p$, can be defined in at least two ways. One way is to find the frequency (and direction) at which the frequency-direction spectrum is maximum. This peak frequency is denoted $f_{p,FD}$. Another way is to find the frequency at which the integrated frequency spectrum is maximum. This is the more conventional definition, because of the plethora of measured frequency spectra, and it is denoted $f_{p,IFS}$. The two peak frequencies may not be the same. If the directional distribution is broad at the frequency for which the integrated frequency spectrum is maximum, it is possible that another frequency, at which the frequency-direction spectrum has a narrow directional distribution, will denote the maximum of the frequency-direction spectrum.

### Peak period

Peak period is the characteristic wave period associated with spectral peak frequency. Denoted generically by $T_p$, it is related to peak frequency by $T_p = 1/f_p$. Peak period from the frequency-direction spectrum is given by $T_{p,FD} = 1/f_{p,FD}$. Conventional peak period, derived from the integrated frequency spectrum, is given by $T_{p,IFS} = 1/f_{p,IFS}$.

### Peak direction

Peak direction is the direction representing the most energy. Given the generic symbol $\theta_p$, it, too, can be defined in several ways. One peak direction can be defined from the maximum of the frequency-direction spectrum. It is denoted by $\theta_{p,FD}$. Another peak direction can be associated with the maximum of the integrated direction spectrum, defined previously. This peak direction is denoted $\theta_{p,IDS}$. It can differ from $\theta_{p,FD}$ if energy in the frequency-direction spectrum is centered at different directions for different frequencies. This condition tends to smear energy along the direction axis in the integrated direction spectrum, thereby shifting the peak relative to the peak of the frequency-direction spectrum. A third measure of peak direction is a weighted average peak direction defined by

$$\theta_{p,SW} = \frac{1}{\left(\frac{1}{4}H_{mo}\right)^2} \sum_{n=1}^{N} S(f_n)\, \theta_{p,n} \qquad (7)$$

where

$\theta_{p,n}$ = peak direction of the directional distribution at the $n^{th}$ frequency of the frequency-direction spectrum

$S(f_n)$ = integrated frequency spectrum from Equation 2

and $H_{mo}$ is defined by Equation 4. This definition gives higher weights to the more energetic peak directions but does not rely on the single distribution with the most energy.

### Directional spread

A fourth type of characteristic parameter is directional spread. This parameter, denoted generically as $\Delta\theta$, gives a measure of the range of directions from which some significant fraction of energy is propagating. The basic definition used here is the arc subtended by the middle two quartiles of a directional distribution. As illustrated in Figure 7, the directional distribution function $D(f_n, \theta_m)$ for a particular frequency $f_n$ can be integrated from one bounding direction (here the shore-parallel direction at +90 deg) to some arbitrary direction $\theta_j$ to make a cumulative distribution function $I(f_n, \theta_j)$. The formal definition is

$$I(f_n, \theta_j) = \sum_{m=1}^{j} D(f_n, \theta_m)\, d\theta \tag{8}$$

where $j$ is the index of a discrete angle bin. The three quartile directions, called $\theta_{25\%,n}$, $\theta_{50\%,n}$, and $\theta_{75\%,n}$, respectively, satisfy the equations

$$I(f_n, \theta_{25\%,n}) = 0.25 \tag{9}$$

$$I(f_n, \theta_{50\%,n}) = 0.50 \tag{10}$$

$$I(f_n, \theta_{75\%,n}) = 0.75 \tag{11}$$

A directional spread parameter for the $n^{th}$ frequency is defined by

$$\Delta\theta_n = \theta_{25\%,n} - \theta_{75\%,n} \tag{12}$$

If Equation 12 is applied at the frequency where the frequency-direction spectrum is maximum, a measure of directional spread at the peak of the frequency-direction spectrum is obtained. This parameter is denoted $\Delta\theta_{FDP}$. If, instead of a directional distribution function at a single frequency, the normalized integrated direction spectrum is used in the set of Equations 8 to 12, a measure of bulk directional spread is obtained. This parameter is given the symbol $\Delta\theta_{IDS}$. A third measure of directional spread is found from a spectrally weighted average of the spreads at each frequency. Denoted as $\Delta\theta_{SW}$, this parameter is found from

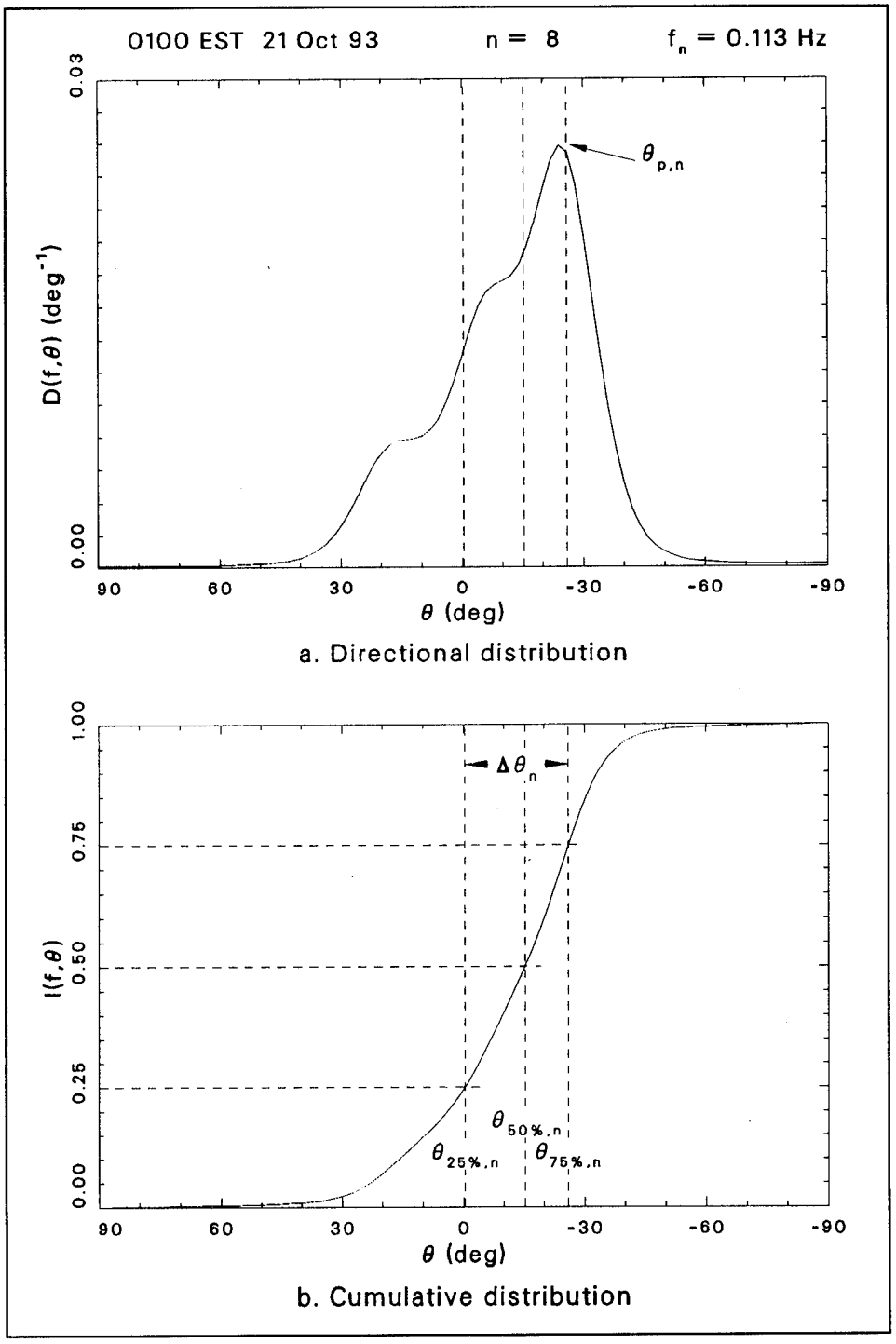



Figure 7. Directional spread computation

$$\Delta\theta_{SW} = \frac{1}{\left(\frac{1}{4}H_{mo}\right)^2} \sum_{n=1}^{N} S(f_n)\,\Delta\theta_n \qquad (13)$$

Equation 13 is like Equation 7 for the spectrally weighted peak direction.

### Reflection coefficient

Following the definition in the *Shore Protection Manual* (1984), a reflection coefficient is a ratio of incident wave height to reflected wave height. This simple definition is based on the concept of unidirectional, monochromatic waves, which almost never occur in the real ocean. An adaptation of this definition for the purposes of this report is to use characteristic incident wave height $H_{mo,i}$ and characteristic reflected wave height $H_{mo,r}$ to define an energy-based reflection coefficient $\chi$ as

$$\chi = \frac{H_{mo,r}}{H_{mo,i}} \tag{14}$$

Incident and reflected wave heights are defined in terms of incident and reflected energy. Squaring both sides of Equation 14 then yields an estimate of the ratio of total reflected to total incident wind wave energy, a characteristic that may be useful in consideration of nearshore dynamics.

Some care must be exercised both in defining and interpreting the characteristic wave heights and their ratio. Intrinsic in all spectral estimates is some level of background system and analysis noise that is not related to wave signals, is often unevenly distributed in direction, and is capable of severely degrading a ratio of entities like that in Equation 14. In a rough attempt to minimize the effects of background noise, a noise estimate is made by finding the minimum of the frequency-direction spectrum at each frequency $S_{\min}(f_n)$, and computing incident energy $E_i$ and reflected energy $E_r$ relative to these minima. Using the full-array frequency-direction spectrum for these computations, the incident energy is

$$E_i = \rho g \sum_{n=1}^{N} \sum_{m=46}^{136} w_m \left[ S(f_n, \theta_m) - S_{\min}(f_n) \right] d\theta \, df \tag{15}$$

and the reflected energy is

$$E_r = \rho g \sum_{n=1}^{N} \sum_{m=1}^{46} w_m \left[ S(f_n, \theta_m) - S_{\min}(f_n) \right] d\theta \, df + \rho g \sum_{n=1}^{N} \sum_{m=136}^{M} w_m \left[ S(f_n, \theta_m) - S_{\min}(f_n) \right] d\theta \, df \tag{16}$$

where $\rho$ is water density, $g$ is gravitational acceleration, and all $w_m = 1$, except $w_1 = w_{46} = w_{136} = w_M = \frac{1}{2}$. The $w_m$ are simply convenient notations that show the proper contributions of the spectrum to the end points of the sums in Equations 15 and 16, and do not otherwise affect the integrations. In terms of incident and reflected energies, the corresponding characteristic wave

heights are $H_{mo,i} = 4\sqrt{E_i/\rho g}$ and $H_{mo,r} = 4\sqrt{E_r/\rho g}$, so that, on substitution into Equation 14, the reflection coefficient becomes

$$\chi = \sqrt{\frac{E_r}{E_i}} \tag{17}$$

The simple noise estimate used here does not eliminate the effects of noise in computing Equation 17 using Equations 15 and 16. This condition is evident in the tabular listings in Appendix A and the plotted results in Appendix B. There is a persistent background level of $\chi \approx 0.1$, which suggests that there is always about 1 percent of incident wave energy propagating back out to sea, a condition that is unlikely to be true. Synthetic data tests by Long and Oltman-Shay (1993) using the algorithms described in this report with a similar array of gauges indicate errors as large as 200 percent for $\chi \approx 0.1$, but with the error dropping rapidly for larger $\chi$. A reasonable way to interpret the results in this report is to consider $\chi \geq 0.2$ as indicative of some reflection, and then to examine such spectra in detail for verification. In the spectrum shown in Figure 6, for example, the tabulated reflection coefficient is 0.26, and the figure does indeed indicate some reflected energy.

### Parameter summary

Together, the 12 parameters $H_{mo}$, $f_{p,FD}$, $f_{p,IFS}$, $T_{p,FD}$, $T_{p,IFS}$, $\theta_{p,FD}$, $\theta_{p,IDS}$, $\theta_{p,SW}$, $\Delta\theta_{IDS}$, $\Delta\theta_{SW}$, $\Delta\theta_{FDP}$, and $\chi$ give a bulk characterization of some properties of the frequency-direction spectra discussed in this report. There are, of course, many other parameters that can be defined, but the present set is simple and is easier to use than the 2,639 discrete spectral densities (29 frequencies $\times$ 91 directions) required for a full description of any linear array spectrum, or the 5,249 elements (29 frequencies $\times$ 181 directions) of any full-array spectrum discussed here.

# 6 Archived Results

Optical disks containing the sets of observed linear-array and full-array frequency-direction spectra from this collection period have been created to archive the observations. Appendix A contains a listing of the date, starting time (EST), and the characterizing parameters defined previously for each case archived. It is intended to be used as an index or catalog of the set of available cases. For reasons explained below, dates in Appendix A are given in the form *yymmdd* to represent year, month, and day, all in two-digit integer form.

Graphic representations of data collection times, some bulk parameters, and some auxiliary environmental variables are contained in Appendix B. One graph is shown for each month of the collection year. The upper part of each graph has time series plots of the bulk parameters $H_{mo}$, $T_{p,IFS}$, $\theta_{p,IDS}$, and $\Delta\theta_{IDS}$ derived from the linear array, and $\chi$ derived from the full array. The lower part of each graph has stick figure plots of three environmental variables. First is a kind of crude wave vector in which the stick vector has a length proportional to $H_{mo}$ and a direction given by $\theta_{p,IDS}$ + 180 deg. The 180 deg is added to provide a physical frame of reference consistent with a vector pointing in the direction of energy propagation. Because peak wave energy is always directed onshore, all stick vectors in this part of the graph will have a component directed upward on the page.

The second stick figure plot is a wind vector as measured with the FRF pier-end anemometer. Mounted at the seaward end of the FRF pier (Figure 2) at an elevation 19.5 m above mean sea level, this instrument gives a reasonable estimate of the wind climate in the vicinity of the 8-m array. A second anemometer at the same elevation, but at the landward end of the pier, serves as a backup instrument. Both anemometers are of the impeller-vane type. Anemometer data are vector averaged and wind velocity variances are computed both in and perpendicular to the mean wind direction. Archived with wave spectral results are mean wind speed, maximum wind speed, wind speed standard deviation, mean wind direction, and a measure of wind direction standard deviation (defined as the arc tangent of the ratio of cross-stream standard deviation of wind velocity to the mean wind speed).

The third stick figure plot is the current vector as measured with a current meter located on the line of the linear array, about 7 m (23 ft) southward of

gauge 8 (Figure 2). Note that this current meter is in a different location from the one used in the first three directional spectral index reports (Long 1991a, 1991b; Long and Smith 1993), or the one used in the subsequent four reports (Long and Smith 1994, Long and Atmadja 1994, Long and Pemberton 1994, Long and Roughton 1994). This instrument was approximately 2.4 m (7.9 ft) off the bottom in water about 8 m (26 ft) deep and, therefore, sensed currents near the bottom. All available current data are plotted. The current meter was subject to storm damage, biological fouling, and duration-related electronic problems, so that data are not available for all of the time covered by this report. Of existing data, the reader may note a significant anticorrelation between cross-shore winds and cross-shore currents. This is consistent with the behavior of wall-bounded, shallow-water, wind-generated currents. Additional details about the anemometers and current meter are given by Birkemeier et al. (1985).

# 7 Retrieving Processed Data

The electro-optical medium containing the directional-spectral data archive is compact, but not very transportable. Consequently, a conversion program has been written to transform the data into a rather conventional, 80-column, formatted form that is much more easily distributed on common magnetic media or over an electronic network. A user requesting some or all of the data will, by default, receive the data in formatted form. It may be possible to transfer the data in other ways, and specific requests can be coordinated with the FRF.

The data archive for the period covered by this report contains two sets of 1,975 files, one set for linear array results, and the other for full array results, with a file for each collection. When converted to formatted form, a linear array file has a length of about 30,000 bytes and a full array file is about twice this size, so the complete archive for the seventh collection year contains roughly 178 MB of information. A user may wish to consider whether this quantity of information will take too much system space before trying to copy the whole archive. Subsets of data can be created by reading the data archive one file at a time.

An ASCII-formatted file is usually named LA*yymmddhhmm*.ASC for a linear-array frequency-direction spectrum, or FD*yymmddhhmm*.ASC for a full-array frequency-direction spectrum. The character grouping *yymmdd* represents the data collection date (as listed in Appendix A), and the character grouping *hhmm* represents the data collection start time as hour and minute, both in two-digit integer form (also from Appendix A).

Once a file is on equipment and in a position to be read, it can be input to a computer program through any ASCII-formatted read statement. Appendix C contains a listing of a FORTRAN program that can read the formatted data files. The variables contained in a data file are listed in the header of the program in Appendix C. A listing of a sample data file of linear-array results is given in Appendix D. The read statements in the program in Appendix C can be visually aligned with the data fields of the listing in Appendix D if the user wishes to edit or visually read a data file. Program variable names, especially those that have parallel symbols in this text, are also listed in the Notation (Appendix E).

A user can obtain data by communicating with the FRF via:

| | |
|---|---|
| Surface mail | Chief, Field Research Facility<br>1261 Duck Road<br>Kitty Hawk, NC 27949-4472 |
| Telephone | (919) 261-3511 |
| FAX | (919) 261-4432 |

or any of the following internet addresses:

long@duck.wes.army.mil
baron@duck.wes.army.mil
bill@duck.wes.army.mil

# 8 Summary of Results

Data from 9 months of the eighth collection year of high-resolution, directional-spectral observations at the FRF have been put in a form that is easily accessible to researchers interested in nearshore processes. Directional gauge array, directional analysis algorithms, and definitions of characterizing parameters are described in the body of this report, as are the location and form of archived data. Both a listing and a graphic presentation of data collection times and characteristic parameters are given in the appendixes. The appendixes also contain a sample data file and a listing of a FORTRAN program that can be used to read a data file.

# References


Bendat, J. S., and Piersol, A. G. (1971). *Random data: Analysis and measurement procedures*. Wiley-Interscience, New York.

Birkemeier, W. A. (1984). "Time scales of nearshore profile changes." *Proceedings of the 19th Coastal Engineering Conference*. American Society of Civil Engineers, Houston, TX, 1507-21.

Birkemeier, W. A., Miller, H. C., Wilhelm, S. D., DeWall, A. E., and Gorbics, C. S. (1985). "A user's guide to the Coastal Engineering Research Center's (CERC's) Field Research Facility," Technical Report CERC-85-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Davis, R. E., and Regier, L. A. (1977). "Methods for estimating directional wave spectra from multi-element arrays," *Journal of Marine Research* 35, 453-77.

Jenkins, G. M., and Watts, D. G. (1968). *Spectral analysis and its applications*. Holden-Day, Oakland, CA.

Leffler, M. W., Baron, C. F., Scarborough, B. L., Hathaway, K. K., and Hayes, R. T. (1992). "Annual data summary for 1990, CERC Field Research Facility," Technical Report CERC-92-3, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Leffler, M. W., Baron, C. F., Scarborough, B. L., and Hathaway, K. K. (1993). "Annual data summary for 1991, CERC Field Research Facility," Technical Report CERC-93-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Long, C. E. (1991a). "Index and bulk parameters for frequency-direction spectra measured at CERC Field Research Facility, September 1986 to August 1987," Miscellaneous Paper CERC-91-6, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Long, C. E. (1991b). "Index and bulk parameters for frequency-direction spectra measured at CERC Field Research Facility, September 1987 to August 1988," Miscellaneous Paper CERC-91-7, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

_____. "Directional wind wave characteristics at Harvest Platform," in preparation, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Long, C. E., and Atmadja, J. (1994). "Index and bulk parameters for frequency-direction spectra measured at CERC Field Research Facility, September 1990 to August 1991," Miscellaneous Paper CERC-94-5, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Long, C. E., and Oltman-Shay, J. M. (1993). "Preliminary estimates of frequency-direction spectra derived from the SAMSON pressure gage array, November 1990 to May 1991," Miscellaneous Paper CERC-93-3, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Long, C. E., and Pemberton, J. L. (1994). "Index and bulk parameters for frequency-direction spectra measured at CERC Field Research Facility, September 1991 to August 1992," Miscellaneous Paper CERC-94-7, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Long, C. E., and Roughton, J. H. (1994). "Index and bulk parameters for frequency-direction spectra measured at CERC Field Research Facility, September 1992 to August 1993," Miscellaneous Paper CERC-94-6, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Long, C. E., and Smith, W. L. (1993). "Index and bulk parameters for frequency-direction spectra measured at CERC Field Research Facility, September 1988 to August 1989," Miscellaneous Paper CERC-93-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

_____. (1994). "Index and bulk parameters for frequency-direction spectra measured at CERC Field Research Facility, September 1989 to August 1990," Miscellaneous Paper CERC-94-2, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Miller, H. C., Birkemeier, W. A., and DeWall, A. E. (1983). "Effects of CERC research pier on nearshore processes." *Proceedings of Coastal Structures '83*. American Society of Civil Engineers, Arlington, VA, 769-84.

Oltman-Shay, J., and Guza, R. T. (1984). "A data-adaptive ocean wave directional-spectrum estimator for pitch and roll type measurements," *Journal of Physical Oceanography* 14, 1800-10.

Pawka, S. S. (1982). "Wave directional characteristics on a partially sheltered coast," Ph.D. diss., Scripps Institute of Oceanography, University of California, San Diego, CA.

_____. (1983). "Island shadows in wave directional spectra," *Journal of Geophysical Research* 88, 2579-91.

*Shore protection manual.* (1984). 4th ed., 2 Vol, U.S. Army Engineer Waterways Experiment Station, U.S. Government Printing Office, Washington, DC.

U.S. Department of Commerce, *Daily weather maps*, published weekly, editions labeled August 30—September 5, 1993 through August 29—September 4, 1994 inclusive, National Oceanic and Atmospheric Administration, Washington, DC.

# Appendix A
# Table of Collection Times and Bulk Parameters

**Table A1**
**Collection Times and Bulk Parameters**

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 930924 | 0100 | 0.40 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -14.0 | -22.0 | 37.6 | 23.6 | 21.8 | 0.28 |
| 930924 | 0400 | 0.35 | 0.083 | 0.083 | 11.98 | 11.98 | -4.0 | -12.0 | -22.7 | 33.9 | 26.8 | 25.4 | 0.29 |
| 930924 | 0700 | 0.34 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -16.0 | -9.6 | 45.6 | 33.4 | 25.0 | 0.29 |
| 930924 | 1000 | 1.11 | 0.230 | 0.220 | 4.35 | 4.54 | 48.0 | 46.0 | 45.3 | 24.2 | 21.8 | 15.0 | 0.17 |
| 930924 | 1300 | 1.40 | 0.171 | 0.171 | 5.83 | 5.83 | 34.0 | 36.0 | 40.2 | 23.6 | 20.2 | 14.3 | 0.20 |
| 930924 | 1600 | 1.25 | 0.171 | 0.162 | 5.83 | 6.19 | 30.0 | 30.0 | 39.0 | 23.0 | 21.9 | 15.7 | 0.17 |
| 930924 | 1900 | 1.05 | 0.152 | 0.152 | 6.59 | 6.59 | 26.0 | 26.0 | 32.6 | 22.3 | 22.1 | 9.7 | 0.12 |
| 930924 | 2200 | 0.92 | 0.142 | 0.142 | 7.04 | 7.04 | 20.0 | 22.0 | 24.2 | 28.1 | 27.6 | 13.0 | 0.11 |
| 930925 | 0100 | 0.84 | 0.142 | 0.142 | 7.04 | 7.04 | 20.0 | 14.0 | 24.4 | 28.5 | 28.7 | 15.6 | 0.12 |
| 930925 | 0400 | 0.71 | 0.162 | 0.162 | 6.19 | 6.19 | 30.0 | 30.0 | 23.4 | 28.8 | 26.9 | 15.5 | 0.13 |
| 930925 | 0700 | 0.65 | 0.171 | 0.171 | 5.83 | 5.83 | 30.0 | 30.0 | 23.3 | 36.1 | 27.8 | 13.6 | 0.11 |
| 930925 | 1000 | 0.64 | 0.191 | 0.152 | 5.24 | 6.59 | 28.0 | 20.0 | 17.6 | 40.7 | 34.2 | 24.6 | 0.10 |
| 930925 | 1300 | 0.67 | 0.162 | 0.162 | 6.19 | 6.19 | 14.0 | 12.0 | 6.2 | 39.7 | 38.2 | 15.5 | 0.13 |
| 930925 | 1600 | 0.65 | 0.171 | 0.269 | 5.83 | 3.72 | 20.0 | 6.0 | -3.3 | 42.5 | 37.7 | 42.0 | 0.14 |
| 930925 | 1900 | 0.55 | 0.240 | 0.269 | 4.17 | 3.72 | 14.0 | 14.0 | 0.5 | 40.2 | 33.7 | 43.1 | 0.15 |
| 930925 | 2200 | 0.56 | 0.308 | 0.259 | 3.25 | 3.86 | -58.0 | 14.0 | -11.6 | 50.1 | 39.5 | 47.3 | 0.15 |
| 930926 | 0100 | 0.61 | 0.220 | 0.210 | 4.54 | 4.75 | -48.0 | -44.0 | -36.2 | 42.2 | 35.3 | 34.3 | 0.15 |
| 930926 | 0400 | 0.59 | 0.210 | 0.201 | 4.75 | 4.98 | -44.0 | -42.0 | -37.0 | 33.3 | 29.0 | 24.4 | 0.15 |
| 930926 | 0700 | 0.55 | 0.210 | 0.191 | 4.75 | 5.24 | -44.0 | -26.0 | -33.2 | 28.1 | 24.7 | 20.2 | 0.16 |
| 930926 | 1000 | 0.54 | 0.191 | 0.191 | 5.24 | 5.24 | -42.0 | -28.0 | -36.1 | 28.3 | 24.2 | 23.1 | 0.18 |
| 930926 | 1300 | 0.52 | 0.210 | 0.191 | 4.75 | 5.24 | -48.0 | -48.0 | -38.4 | 30.3 | 23.1 | 26.2 | 0.21 |
| 930926 | 1600 | 0.53 | 0.201 | 0.093 | 4.98 | 10.72 | -50.0 | -50.0 | -42.5 | 26.5 | 18.8 | 17.1 | 0.26 |
| 930926 | 1900 | 0.48 | 0.093 | 0.093 | 10.72 | 10.72 | -32.0 | -50.0 | -39.1 | 27.0 | 16.0 | 20.6 | 0.26 |
| 930926 | 2200 | 0.44 | 0.103 | 0.103 | 9.71 | 9.71 | -36.0 | -36.0 | -35.6 | 24.3 | 19.1 | 21.2 | 0.20 |
| 930927 | 0100 | 0.47 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | -34.0 | -37.0 | 26.4 | 18.9 | 19.9 | 0.31 |
| 930927 | 0400 | 0.50 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | -38.0 | -39.1 | 26.5 | 21.5 | 22.4 | 0.27 |
| 930927 | 0700 | 0.57 | 0.113 | 0.113 | 8.87 | 8.87 | -24.0 | -40.0 | -33.9 | 25.3 | 19.8 | 19.8 | 0.29 |
| 930927 | 1000 | 0.59 | 0.113 | 0.113 | 8.87 | 8.87 | -24.0 | -40.0 | -35.7 | 21.8 | 16.0 | 15.3 | 0.19 |
| 930927 | 1300 | 0.63 | 0.113 | 0.113 | 8.87 | 8.87 | -24.0 | -52.0 | -36.4 | 25.0 | 13.8 | 14.8 | 0.26 |
| 930927 | 1600 | 0.73 | 0.152 | 0.103 | 6.59 | 9.71 | -42.0 | -52.0 | -40.1 | 23.1 | 11.5 | 14.0 | 0.26 |
| 930927 | 1900 | 0.58 | 0.152 | 0.113 | 6.59 | 8.87 | -44.0 | -44.0 | -42.4 | 22.7 | 11.8 | 17.1 | 0.25 |
| 930927 | 2200 | 0.47 | 0.142 | 0.113 | 7.04 | 8.87 | -40.0 | -38.0 | -34.9 | 23.4 | 16.1 | 18.0 | 0.21 |
| 930928 | 0100 | 0.64 | 0.113 | 0.113 | 8.87 | 8.87 | -26.0 | 66.0 | 24.5 | 87.1 | 19.4 | 22.4 | 0.20 |
| 930928 | 0400 | 0.78 | 0.201 | 0.220 | 4.98 | 4.54 | 48.0 | 48.0 | 31.5 | 57.2 | 17.3 | 11.7 | 0.21 |
| 930928 | 0700 | 0.66 | 0.210 | 0.210 | 4.75 | 4.75 | 52.0 | 56.0 | 21.7 | 76.0 | 19.9 | 10.4 | 0.20 |
| 930928 | 1000 | 0.56 | 0.210 | 0.113 | 4.75 | 8.87 | 52.0 | -38.0 | 7.8 | 81.5 | 23.3 | 19.9 | 0.16 |

*(Sheet 1 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 930928 | 1300 | 0.53 | 0.162 | 0.113 | 6.19 | 8.87 | -40.0 | -38.0 | 0.6 | 60.3 | 43.5 | 25.3 | 0.15 |
| 930928 | 1600 | 0.49 | 0.123 | 0.123 | 8.16 | 8.16 | -24.0 | -36.0 | -6.9 | 55.5 | 45.8 | 15.9 | 0.21 |
| 930928 | 1900 | 0.44 | 0.132 | 0.123 | 7.56 | 8.16 | -36.0 | -36.0 | -19.9 | 43.4 | 42.0 | 19.2 | 0.24 |
| 930928 | 2200 | 0.42 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -36.0 | -20.3 | 36.9 | 32.2 | 21.3 | 0.19 |
| 930929 | 0100 | 0.40 | 0.171 | 0.123 | 5.83 | 8.16 | -44.0 | -34.0 | -26.0 | 35.1 | 31.2 | 24.1 | 0.20 |
| 930929 | 0400 | 0.44 | 0.308 | 0.113 | 3.25 | 8.87 | 90.0 | -28.0 | -2.2 | 58.9 | 27.9 | 20.4 | 0.23 |
| 930929 | 0700 | 0.51 | 0.259 | 0.279 | 3.86 | 3.59 | 64.0 | 66.0 | 32.2 | 87.2 | 24.0 | 18.0 | 0.21 |
| 930929 | 1000 | 0.54 | 0.259 | 0.259 | 3.86 | 3.86 | 66.0 | 66.0 | 29.1 | 76.7 | 25.2 | 23.5 | 0.20 |
| 930929 | 1300 | 0.54 | 0.123 | 0.259 | 8.16 | 3.86 | -32.0 | -30.0 | 23.1 | 66.9 | 31.8 | 38.0 | 0.20 |
| 930929 | 1600 | 0.45 | 0.123 | 0.123 | 8.16 | 8.16 | -32.0 | -30.0 | 1.6 | 59.7 | 31.8 | 23.7 | 0.24 |
| 930929 | 1900 | 0.40 | 0.113 | 0.123 | 8.87 | 8.16 | -30.0 | -32.0 | 1.8 | 52.9 | 33.5 | 27.6 | 0.24 |
| 930929 | 2200 | 0.37 | 0.132 | 0.113 | 7.56 | 8.87 | -30.0 | -18.0 | -2.1 | 44.7 | 30.4 | 27.6 | 0.20 |
| 930930 | 0100 | 0.39 | 0.123 | 0.123 | 8.16 | 8.16 | -34.0 | -16.0 | -6.2 | 40.3 | 30.1 | 27.8 | 0.20 |
| 930930 | 0400 | 0.38 | 0.123 | 0.123 | 8.16 | 8.16 | -36.0 | -18.0 | -17.6 | 36.6 | 32.3 | 27.2 | 0.25 |
| 930930 | 0700 | 0.39 | 0.318 | 0.318 | 3.15 | 3.15 | 64.0 | 64.0 | 8.6 | 80.5 | 28.0 | 10.4 | 0.30 |
| 930930 | 1000 | 1.41 | 0.171 | 0.171 | 5.83 | 5.83 | 46.0 | 50.0 | 49.6 | 14.7 | 12.8 | 7.9 | 0.18 |
| 930930 | 1300 | 1.51 | 0.171 | 0.162 | 5.83 | 6.19 | 42.0 | 42.0 | 40.8 | 19.3 | 16.8 | 15.2 | 0.17 |
| 930930 | 1600 | 1.34 | 0.171 | 0.171 | 5.83 | 5.83 | 32.0 | 54.0 | 41.4 | 21.7 | 16.6 | 13.1 | 0.18 |
| 930930 | 1900 | 1.12 | 0.181 | 0.181 | 5.52 | 5.52 | 34.0 | 34.0 | 39.0 | 21.1 | 18.1 | 15.0 | 0.17 |
| 930930 | 2200 | 0.96 | 0.171 | 0.181 | 5.83 | 5.52 | 28.0 | 46.0 | 38.3 | 21.4 | 17.2 | 17.3 | 0.12 |
| 931001 | 0100 | 1.02 | 0.171 | 0.171 | 5.83 | 5.83 | 26.0 | 46.0 | 36.4 | 24.4 | 20.9 | 16.9 | 0.11 |
| 931001 | 0400 | 0.96 | 0.162 | 0.181 | 6.19 | 5.52 | 20.0 | 46.0 | 34.6 | 29.5 | 19.7 | 18.7 | 0.14 |
| 931001 | 1000 | 0.79 | 0.181 | 0.181 | 5.52 | 5.52 | 40.0 | 40.0 | 24.4 | 37.5 | 20.4 | 14.8 | 0.13 |
| 931001 | 1300 | 0.81 | 0.152 | 0.152 | 6.59 | 6.59 | 14.0 | 40.0 | 10.8 | 51.0 | 23.5 | 21.9 | 0.11 |
| 931001 | 1600 | 0.96 | 0.162 | 0.152 | 6.19 | 6.59 | 14.0 | 14.0 | 7.3 | 39.5 | 25.8 | 20.6 | 0.12 |
| 931001 | 1900 | 0.96 | 0.093 | 0.103 | 10.72 | 9.71 | -16.0 | -16.0 | 1.9 | 35.4 | 25.5 | 27.0 | 0.14 |
| 931001 | 2200 | 0.94 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | 0.0 | 4.3 | 32.8 | 25.0 | 22.1 | 0.12 |
| 931002 | 0100 | 1.00 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | -14.0 | -4.3 | 26.3 | 22.8 | 16.3 | 0.09 |
| 931002 | 0400 | 0.96 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -14.0 | -4.6 | 24.9 | 24.6 | 19.6 | 0.12 |
| 931002 | 0700 | 0.90 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -16.0 | -8.0 | 23.5 | 23.9 | 20.1 | 0.16 |
| 931002 | 1000 | 0.86 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -6.0 | -10.5 | 22.6 | 22.9 | 19.4 | 0.14 |
| 931002 | 1300 | 0.88 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -4.0 | -6.9 | 24.1 | 23.4 | 18.6 | 0.10 |
| 931002 | 1600 | 0.84 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -2.0 | -8.6 | 24.9 | 24.1 | 19.7 | 0.13 |
| 931002 | 1900 | 0.76 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | -12.0 | -13.5 | 27.0 | 23.5 | 21.9 | 0.16 |
| 931002 | 2200 | 0.70 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -18.0 | -18.4 | 27.2 | 23.3 | 18.9 | 0.16 |
| 931003 | 0100 | 0.62 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -20.0 | -19.0 | 27.4 | 21.7 | 18.9 | 0.14 |
| 931003 | 0400 | 0.59 | 0.113 | 0.113 | 8.87 | 8.87 | -26.0 | -24.0 | -23.4 | 27.1 | 21.4 | 18.9 | 0.17 |
| 931003 | 0700 | 0.53 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -22.0 | -24.0 | 29.2 | 23.5 | 26.1 | 0.20 |
| 931003 | 1000 | 0.47 | 0.113 | 0.113 | 8.87 | 8.87 | -20.0 | -24.0 | -12.6 | 35.1 | 27.0 | 26.8 | 0.23 |
| 931003 | 1300 | 0.91 | 0.240 | 0.240 | 4.17 | 4.17 | 56.0 | 58.0 | 43.0 | 24.0 | 16.7 | 10.4 | 0.18 |
| 931003 | 1600 | 0.79 | 0.240 | 0.240 | 4.17 | 4.17 | 58.0 | 58.0 | 36.1 | 56.5 | 24.9 | 15.1 | 0.14 |
| 931003 | 1900 | 0.74 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | 56.0 | 23.9 | 65.9 | 26.6 | 20.3 | 0.13 |
| 931003 | 2200 | 0.66 | 0.113 | 0.113 | 8.87 | 8.87 | -32.0 | -32.0 | 17.1 | 63.9 | 30.5 | 24.6 | 0.15 |
| 931004 | 0100 | 0.61 | 0.103 | 0.113 | 9.71 | 8.87 | -14.0 | -14.0 | 9.4 | 55.7 | 29.5 | 21.9 | 0.16 |
| 931004 | 0400 | 0.57 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -20.0 | 1.9 | 41.3 | 32.4 | 22.6 | 0.14 |
| 931004 | 0700 | 0.54 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -24.0 | -10.8 | 36.5 | 31.1 | 21.7 | 0.17 |
| 931004 | 1000 | 0.52 | 0.113 | 0.113 | 8.87 | 8.87 | -14.0 | -14.0 | -10.5 | 34.8 | 30.4 | 19.8 | 0.18 |
| 931004 | 1300 | 0.49 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -18.0 | -14.7 | 26.1 | 28.4 | 21.4 | 0.16 |
| 931004 | 1600 | 0.50 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -30.0 | -28.0 | 24.6 | 25.9 | 21.3 | 0.16 |
| 931004 | 1900 | 0.49 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -30.0 | -25.1 | 25.4 | 22.8 | 22.0 | 0.22 |
| 931004 | 2200 | 0.46 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -24.0 | -27.4 | 25.3 | 21.3 | 20.1 | 0.24 |
| 931005 | 0100 | 0.43 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -32.0 | -27.4 | 23.7 | 20.7 | 20.4 | 0.20 |
| 931005 | 0400 | 0.41 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -30.0 | -30.6 | 21.9 | 19.5 | 19.2 | 0.20 |
| 931005 | 0700 | 0.42 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -30.0 | -29.2 | 24.1 | 22.3 | 20.4 | 0.25 |
| 931005 | 1000 | 0.53 | 0.113 | 0.113 | 8.87 | 8.87 | -32.0 | 62.0 | 11.1 | 80.1 | 23.1 | 23.4 | 0.21 |
| 931005 | 1300 | 1.17 | 0.201 | 0.201 | 4.98 | 4.98 | 46.0 | 50.0 | 38.4 | 27.5 | 22.6 | 18.2 | 0.13 |
| 931005 | 1600 | 1.44 | 0.171 | 0.171 | 5.83 | 5.83 | 40.0 | 40.0 | 34.7 | 27.9 | 24.7 | 18.9 | 0.12 |
| 931005 | 1900 | 1.31 | 0.171 | 0.162 | 5.83 | 6.19 | 34.0 | 24.0 | 29.1 | 32.1 | 26.3 | 21.2 | 0.13 |

*(Sheet 2 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931005 | 2200 | 1.17 | 0.162 | 0.162 | 6.19 | 6.19 | 20.0 | 22.0 | 29.3 | 34.8 | 27.6 | 17.2 | 0.11 |
| 931006 | 0100 | 1.13 | 0.142 | 0.210 | 7.04 | 4.75 | 26.0 | 24.0 | 27.6 | 38.3 | 29.9 | 30.1 | 0.10 |
| 931006 | 0400 | 1.13 | 0.152 | 0.201 | 6.59 | 4.98 | 26.0 | 28.0 | 23.8 | 38.8 | 30.1 | 24.6 | 0.09 |
| 931006 | 0700 | 1.18 | 0.210 | 0.191 | 4.75 | 5.24 | 18.0 | 22.0 | 17.8 | 38.9 | 31.4 | 23.1 | 0.10 |
| 931006 | 1000 | 1.16 | 0.191 | 0.191 | 5.24 | 5.24 | 26.0 | 28.0 | 19.0 | 42.3 | 37.2 | 29.8 | 0.11 |
| 931006 | 1300 | 1.07 | 0.201 | 0.181 | 4.98 | 5.52 | 34.0 | 12.0 | 13.0 | 41.8 | 35.8 | 30.7 | 0.10 |
| 931006 | 1600 | 1.01 | 0.191 | 0.191 | 5.24 | 5.24 | 22.0 | -16.0 | 10.0 | 39.3 | 34.3 | 28.1 | 0.10 |
| 931006 | 1900 | 1.04 | 0.181 | 0.181 | 5.52 | 5.52 | 28.0 | -18.0 | 7.8 | 39.4 | 34.6 | 31.1 | 0.10 |
| 931006 | 2200 | 1.08 | 0.132 | 0.171 | 7.56 | 5.83 | -26.0 | -8.0 | 1.9 | 40.1 | 36.7 | 34.5 | 0.11 |
| 931007 | 0100 | 1.15 | 0.171 | 0.171 | 5.83 | 5.83 | -8.0 | -10.0 | 3.1 | 39.4 | 36.8 | 28.8 | 0.10 |
| 931007 | 0400 | 1.15 | 0.171 | 0.171 | 5.83 | 5.83 | -2.0 | 0.0 | -2.1 | 32.2 | 30.5 | 21.8 | 0.10 |
| 931007 | 0700 | 1.07 | 0.162 | 0.162 | 6.19 | 6.19 | -40.0 | -12.0 | -15.7 | 36.8 | 39.3 | 38.5 | 0.11 |
| 931007 | 1000 | 0.98 | 0.074 | 0.171 | 13.56 | 5.83 | -20.0 | -16.0 | -29.6 | 37.1 | 39.8 | 36.8 | 0.12 |
| 931007 | 1300 | 0.89 | 0.171 | 0.132 | 5.83 | 7.56 | -40.0 | -38.0 | -33.1 | 37.2 | 37.7 | 25.6 | 0.12 |
| 931007 | 1600 | 0.90 | 0.162 | 0.074 | 6.19 | 13.56 | -40.0 | -36.0 | -34.1 | 36.0 | 35.6 | 25.2 | 0.12 |
| 931007 | 1900 | 1.01 | 0.171 | 0.074 | 5.83 | 13.56 | -42.0 | -38.0 | -34.5 | 33.4 | 31.9 | 23.7 | 0.12 |
| 931007 | 2200 | 1.03 | 0.152 | 0.152 | 6.59 | 6.59 | -38.0 | -36.0 | -33.3 | 30.2 | 26.7 | 14.1 | 0.13 |
| 931008 | 0100 | 1.02 | 0.142 | 0.152 | 7.04 | 6.59 | -38.0 | -38.0 | -35.1 | 29.6 | 26.0 | 18.2 | 0.13 |
| 931008 | 0400 | 0.95 | 0.142 | 0.152 | 7.04 | 6.59 | -34.0 | -32.0 | -33.8 | 29.3 | 24.8 | 18.8 | 0.13 |
| 931008 | 0700 | 1.25 | 0.152 | 0.142 | 6.59 | 7.04 | -36.0 | -34.0 | -33.4 | 27.2 | 25.0 | 14.7 | 0.12 |
| 931008 | 1000 | 1.85 | 0.142 | 0.162 | 7.04 | 6.19 | -36.0 | -36.0 | -29.0 | 29.7 | 26.6 | 15.7 | 0.10 |
| 931008 | 1300 | 2.03 | 0.123 | 0.123 | 8.16 | 8.16 | -30.0 | -28.0 | -12.4 | 37.4 | 26.8 | 11.0 | 0.10 |
| 931008 | 1600 | 1.85 | 0.123 | 0.113 | 8.16 | 8.87 | -30.0 | -28.0 | -2.6 | 47.8 | 27.1 | 13.1 | 0.11 |
| 931008 | 1900 | 1.75 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | 24.0 | 8.4 | 54.4 | 22.6 | 19.1 | 0.12 |
| 931008 | 2200 | 1.56 | 0.123 | 0.123 | 8.16 | 8.16 | -28.0 | 12.0 | 14.3 | 43.7 | 29.8 | 33.3 | 0.10 |
| 931009 | 0100 | 1.32 | 0.132 | 0.132 | 7.56 | 7.56 | 10.0 | 12.0 | 7.6 | 37.0 | 31.8 | 39.0 | 0.10 |
| 931009 | 0400 | 1.02 | 0.152 | 0.132 | 6.59 | 7.56 | 12.0 | 10.0 | 5.4 | 35.5 | 29.7 | 39.8 | 0.10 |
| 931009 | 0700 | 0.82 | 0.132 | 0.123 | 7.56 | 8.16 | -38.0 | -38.0 | -12.9 | 42.4 | 31.6 | 27.2 | 0.11 |
| 931009 | 1000 | 0.66 | 0.132 | 0.132 | 7.56 | 7.56 | -28.0 | -28.0 | -17.2 | 41.2 | 33.2 | 22.4 | 0.14 |
| 931009 | 1300 | 0.57 | 0.123 | 0.123 | 8.16 | 8.16 | -30.0 | -30.0 | -22.0 | 40.1 | 35.8 | 13.7 | 0.17 |
| 931009 | 1600 | 0.54 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -38.0 | -35.6 | 34.1 | 27.5 | 13.5 | 0.19 |
| 931009 | 1900 | 0.57 | 0.132 | 0.132 | 7.56 | 7.56 | -34.0 | -36.0 | -35.3 | 26.0 | 17.6 | 10.4 | 0.18 |
| 931009 | 2200 | 0.56 | 0.142 | 0.123 | 7.04 | 8.16 | -36.0 | -30.0 | -33.7 | 30.5 | 17.6 | 17.4 | 0.19 |
| 931010 | 0100 | 0.51 | 0.123 | 0.132 | 8.16 | 7.56 | -34.0 | -34.0 | -32.0 | 31.9 | 20.2 | 20.7 | 0.19 |
| 931010 | 0400 | 0.50 | 0.113 | 0.123 | 8.87 | 8.16 | -20.0 | -20.0 | -28.6 | 28.0 | 20.0 | 16.8 | 0.21 |
| 931010 | 0700 | 0.51 | 0.123 | 0.132 | 8.16 | 7.56 | -20.0 | -28.0 | -27.9 | 22.4 | 18.5 | 13.9 | 0.21 |
| 931010 | 1000 | 1.10 | 0.210 | 0.220 | 4.75 | 4.54 | 48.0 | 56.0 | 38.4 | 30.4 | 17.1 | 14.2 | 0.20 |
| 931010 | 1300 | 2.38 | 0.142 | 0.142 | 7.04 | 7.04 | 42.0 | 44.0 | 42.1 | 22.9 | 21.3 | 21.4 | 0.20 |
| 931010 | 1600 | 2.37 | 0.132 | 0.132 | 7.56 | 7.56 | 22.0 | 22.0 | 33.1 | 23.6 | 19.7 | 10.5 | 0.20 |
| 931010 | 1900 | 2.23 | 0.132 | 0.132 | 7.56 | 7.56 | 22.0 | 22.0 | 32.8 | 26.2 | 22.3 | 14.2 | 0.16 |
| 931010 | 2200 | 2.22 | 0.132 | 0.132 | 7.56 | 7.56 | 20.0 | 20.0 | 29.0 | 27.1 | 23.8 | 14.9 | 0.16 |
| 931011 | 0100 | 2.32 | 0.132 | 0.132 | 7.56 | 7.56 | 10.0 | 16.0 | 27.2 | 27.8 | 25.0 | 18.4 | 0.16 |
| 931011 | 0400 | 2.28 | 0.132 | 0.132 | 7.56 | 7.56 | 12.0 | 14.0 | 23.8 | 27.2 | 24.7 | 16.8 | 0.14 |
| 931011 | 0700 | 2.05 | 0.123 | 0.123 | 8.16 | 8.16 | 10.0 | 10.0 | 19.8 | 28.2 | 26.8 | 16.4 | 0.12 |
| 931011 | 1000 | 2.04 | 0.103 | 0.132 | 9.71 | 7.56 | -8.0 | 8.0 | 17.1 | 31.1 | 27.2 | 24.8 | 0.11 |
| 931011 | 1300 | 2.41 | 0.123 | 0.123 | 8.16 | 8.16 | -4.0 | 4.0 | 9.9 | 29.0 | 27.6 | 21.1 | 0.12 |
| 931011 | 1600 | 2.64 | 0.103 | 0.123 | 9.71 | 8.16 | -6.0 | -6.0 | 12.8 | 29.0 | 27.8 | 20.9 | 0.11 |
| 931011 | 1900 | 2.52 | 0.123 | 0.123 | 8.16 | 8.16 | 6.0 | 4.0 | 6.0 | 27.6 | 27.1 | 19.9 | 0.11 |
| 931011 | 2200 | 2.23 | 0.113 | 0.123 | 8.87 | 8.16 | -2.0 | -4.0 | 5.4 | 27.0 | 26.9 | 21.6 | 0.10 |
| 931012 | 0100 | 2.13 | 0.113 | 0.113 | 8.87 | 8.87 | -4.0 | -2.0 | 4.0 | 31.0 | 32.8 | 16.5 | 0.11 |
| 931012 | 0400 | 2.00 | 0.123 | 0.123 | 8.16 | 8.16 | -2.0 | 0.0 | -4.8 | 33.3 | 35.2 | 28.4 | 0.13 |
| 931012 | 0700 | 1.51 | 0.113 | 0.113 | 8.87 | 8.87 | 0.0 | 2.0 | 3.6 | 28.0 | 31.6 | 18.3 | 0.13 |
| 931012 | 1000 | 1.15 | 0.103 | 0.103 | 9.71 | 9.71 | -8.0 | -6.0 | 1.3 | 26.1 | 26.4 | 17.0 | 0.13 |
| 931012 | 1300 | 1.04 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | -2.0 | 8.9 | 29.6 | 25.1 | 18.3 | 0.20 |
| 931012 | 1600 | 0.94 | 0.093 | 0.103 | 10.72 | 9.71 | -2.0 | 2.0 | 13.2 | 29.0 | 24.8 | 16.6 | 0.21 |
| 931012 | 2200 | 0.69 | 0.103 | 0.103 | 9.71 | 9.71 | 2.0 | 4.0 | 7.6 | 26.5 | 27.1 | 18.3 | 0.18 |
| 931013 | 0100 | 0.67 | 0.123 | 0.113 | 8.16 | 8.87 | 20.0 | 14.0 | 13.0 | 29.7 | 27.4 | 29.1 | 0.20 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931013 | 0400 | 0.61 | 0.123 | 0.113 | 8.16 | 8.87 | 12.0 | 18.0 | 16.5 | 33.7 | 27.4 | 29.0 | 0.19 |
| 931013 | 0700 | 0.59 | 0.123 | 0.123 | 8.16 | 8.16 | 10.0 | 10.0 | 13.1 | 34.1 | 26.1 | 24.6 | 0.21 |
| 931013 | 1000 | 0.57 | 0.132 | 0.123 | 7.56 | 8.16 | 12.0 | 12.0 | 9.9 | 33.4 | 24.8 | 26.4 | 0.19 |
| 931013 | 1300 | 0.60 | 0.132 | 0.132 | 7.56 | 7.56 | 12.0 | 12.0 | 16.3 | 36.8 | 24.8 | 22.7 | 0.19 |
| 931013 | 1600 | 0.61 | 0.093 | 0.103 | 10.72 | 9.71 | 4.0 | 28.0 | 21.8 | 39.7 | 26.2 | 22.3 | 0.14 |
| 931013 | 1900 | 0.59 | 0.220 | 0.103 | 4.54 | 9.71 | 46.0 | 30.0 | 16.4 | 45.5 | 26.4 | 22.2 | 0.18 |
| 931013 | 2200 | 0.57 | 0.132 | 0.103 | 7.56 | 9.71 | 14.0 | 14.0 | 14.1 | 46.4 | 24.6 | 18.8 | 0.15 |
| 931014 | 0100 | 0.60 | 0.113 | 0.113 | 8.87 | 8.87 | -6.0 | 14.0 | 11.1 | 41.2 | 28.3 | 16.3 | 0.17 |
| 931014 | 0400 | 0.75 | 0.083 | 0.259 | 11.98 | 3.86 | -12.0 | 12.0 | 7.2 | 38.4 | 30.7 | 29.0 | 0.11 |
| 931014 | 0700 | 0.92 | 0.230 | 0.210 | 4.35 | 4.75 | 20.0 | 16.0 | 11.9 | 34.1 | 29.0 | 23.4 | 0.10 |
| 931014 | 1000 | 1.15 | 0.171 | 0.181 | 5.83 | 5.52 | -8.0 | -8.0 | 0.9 | 28.3 | 25.7 | 19.5 | 0.10 |
| 931014 | 1300 | 1.18 | 0.171 | 0.171 | 5.83 | 5.83 | 4.0 | -4.0 | 1.8 | 26.6 | 25.0 | 14.3 | 0.11 |
| 931014 | 1600 | 1.18 | 0.093 | 0.171 | 10.72 | 5.83 | -10.0 | -10.0 | 0.9 | 27.3 | 25.0 | 20.5 | 0.11 |
| 931014 | 1900 | 1.11 | 0.171 | 0.162 | 5.83 | 6.19 | 8.0 | -10.0 | 1.3 | 28.7 | 26.6 | 19.5 | 0.13 |
| 931014 | 2200 | 1.05 | 0.171 | 0.162 | 5.83 | 6.19 | 12.0 | -8.0 | 2.4 | 25.7 | 24.2 | 19.8 | 0.11 |
| 931015 | 0100 | 1.01 | 0.093 | 0.171 | 10.72 | 5.83 | -12.0 | -8.0 | 1.6 | 25.8 | 22.8 | 18.1 | 0.12 |
| 931015 | 0400 | 1.00 | 0.171 | 0.162 | 5.83 | 6.19 | 8.0 | -10.0 | 5.1 | 27.5 | 25.9 | 21.2 | 0.13 |
| 931015 | 0700 | 1.00 | 0.171 | 0.152 | 5.83 | 6.59 | 6.0 | 4.0 | 3.4 | 28.0 | 27.1 | 19.5 | 0.13 |
| 931015 | 1000 | 0.89 | 0.162 | 0.162 | 6.19 | 6.19 | 14.0 | -6.0 | 9.4 | 29.2 | 27.0 | 17.1 | 0.12 |
| 931015 | 1300 | 0.90 | 0.123 | 0.171 | 8.16 | 5.83 | 0.0 | 0.0 | 2.7 | 27.2 | 25.3 | 20.4 | 0.11 |
| 931015 | 1600 | 0.98 | 0.132 | 0.132 | 7.56 | 7.56 | -8.0 | -8.0 | -2.8 | 28.1 | 26.6 | 13.1 | 0.12 |
| 931015 | 1900 | 1.01 | 0.132 | 0.123 | 7.56 | 8.16 | -8.0 | -8.0 | 0.6 | 27.6 | 27.8 | 13.9 | 0.13 |
| 931015 | 2200 | 0.97 | 0.113 | 0.113 | 8.87 | 8.87 | 0.0 | 0.0 | 4.0 | 26.8 | 25.6 | 9.1 | 0.12 |
| 931016 | 0100 | 1.05 | 0.113 | 0.113 | 8.87 | 8.87 | -12.0 | 0.0 | -0.1 | 24.0 | 24.7 | 15.0 | 0.10 |
| 931016 | 0400 | 1.11 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 2.0 | -1.3 | 26.0 | 26.4 | 16.7 | 0.10 |
| 931016 | 0700 | 1.04 | 0.123 | 0.113 | 8.16 | 8.87 | 0.0 | 0.0 | 0.3 | 29.1 | 29.1 | 18.9 | 0.11 |
| 931016 | 1000 | 0.91 | 0.123 | 0.113 | 8.16 | 8.87 | 0.0 | 0.0 | -2.5 | 31.9 | 33.3 | 21.9 | 0.12 |
| 931016 | 1300 | 0.89 | 0.123 | 0.123 | 8.16 | 8.16 | 2.0 | 0.0 | -2.9 | 28.0 | 30.1 | 18.5 | 0.11 |
| 931016 | 1600 | 0.92 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 2.0 | -2.3 | 27.2 | 29.7 | 15.8 | 0.12 |
| 931016 | 1900 | 0.88 | 0.113 | 0.113 | 8.87 | 8.87 | -4.0 | -4.0 | -4.5 | 26.7 | 28.8 | 16.7 | 0.15 |
| 931016 | 2200 | 0.84 | 0.123 | 0.123 | 8.16 | 8.16 | -6.0 | -4.0 | -4.3 | 30.2 | 32.8 | 23.0 | 0.15 |
| 931017 | 0100 | 0.92 | 0.123 | 0.123 | 8.16 | 8.16 | -12.0 | -12.0 | -12.9 | 29.8 | 33.6 | 17.9 | 0.12 |
| 931017 | 0400 | 1.15 | 0.113 | 0.132 | 8.87 | 7.56 | 4.0 | -16.0 | -24.4 | 38.5 | 30.4 | 19.3 | 0.13 |
| 931017 | 0700 | 1.58 | 0.191 | 0.191 | 5.24 | 5.24 | -24.0 | -22.0 | -19.9 | 34.9 | 33.5 | 24.6 | 0.11 |
| 931017 | 1000 | 2.08 | 0.162 | 0.162 | 6.19 | 6.19 | -30.0 | -32.0 | -16.1 | 35.6 | 36.0 | 27.5 | 0.10 |
| 931017 | 1300 | 1.77 | 0.132 | 0.132 | 7.56 | 7.56 | -38.0 | -38.0 | -15.3 | 37.1 | 33.9 | 23.5 | 0.10 |
| 931017 | 1600 | 1.59 | 0.132 | 0.132 | 7.56 | 7.56 | -32.0 | -16.0 | -17.3 | 33.6 | 32.0 | 27.9 | 0.11 |
| 931017 | 1900 | 1.36 | 0.123 | 0.123 | 8.16 | 8.16 | -10.0 | -10.0 | -10.4 | 39.8 | 33.8 | 30.3 | 0.14 |
| 931017 | 2200 | 1.04 | 0.113 | 0.113 | 8.87 | 8.87 | -38.0 | 50.0 | -4.3 | 60.6 | 33.7 | 31.6 | 0.17 |
| 931018 | 0100 | 0.91 | 0.113 | 0.113 | 8.87 | 8.87 | -14.0 | 4.0 | 6.9 | 48.5 | 29.2 | 27.7 | 0.12 |
| 931018 | 0400 | 0.85 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -2.0 | -4.0 | 41.1 | 30.2 | 37.4 | 0.14 |
| 931018 | 0700 | 0.81 | 0.113 | 0.123 | 8.87 | 8.16 | -2.0 | 0.0 | 7.7 | 35.2 | 30.7 | 34.5 | 0.20 |
| 931018 | 1000 | 0.86 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | 0.0 | 7.4 | 39.3 | 26.9 | 22.8 | 0.19 |
| 931018 | 1300 | 0.89 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | 2.0 | 5.2 | 45.1 | 25.9 | 21.9 | 0.14 |
| 931018 | 1600 | 0.89 | 0.113 | 0.103 | 8.87 | 9.71 | -14.0 | -12.0 | -3.5 | 42.7 | 27.2 | 18.7 | 0.11 |
| 931018 | 1900 | 0.83 | 0.113 | 0.113 | 8.87 | 8.87 | -10.0 | -10.0 | -2.1 | 43.2 | 31.0 | 27.1 | 0.16 |
| 931018 | 2200 | 0.77 | 0.103 | 0.103 | 9.71 | 9.71 | -2.0 | -6.0 | 2.4 | 42.3 | 29.4 | 20.8 | 0.18 |
| 931019 | 0100 | 0.69 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -12.0 | -3.9 | 37.6 | 28.1 | 18.5 | 0.14 |
| 931019 | 0400 | 0.68 | 0.103 | 0.113 | 9.71 | 8.87 | -2.0 | -10.0 | -1.0 | 32.8 | 27.3 | 21.0 | 0.13 |
| 931019 | 0700 | 0.67 | 0.113 | 0.113 | 8.87 | 8.87 | -12.0 | -10.0 | -7.7 | 35.2 | 32.6 | 20.6 | 0.17 |
| 931019 | 1000 | 0.63 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -16.0 | -2.7 | 38.2 | 33.7 | 19.8 | 0.18 |
| 931019 | 1300 | 0.59 | 0.113 | 0.113 | 8.87 | 8.87 | -8.0 | -12.0 | -5.8 | 36.2 | 34.2 | 22.8 | 0.19 |
| 931019 | 1600 | 0.60 | 0.123 | 0.113 | 8.16 | 8.87 | -16.0 | -14.0 | -11.9 | 32.2 | 31.7 | 22.8 | 0.14 |
| 931019 | 1900 | 0.63 | 0.113 | 0.113 | 8.87 | 8.87 | -14.0 | -16.0 | -12.5 | 31.8 | 34.4 | 19.9 | 0.19 |
| 931019 | 2200 | 0.63 | 0.113 | 0.113 | 8.87 | 8.87 | -2.0 | -2.0 | -16.1 | 35.1 | 36.9 | 25.3 | 0.21 |
| 931020 | 0100 | 0.66 | 0.103 | 0.103 | 9.71 | 9.71 | -2.0 | -12.0 | -3.9 | 33.4 | 31.9 | 16.9 | 0.18 |
| 931020 | 0400 | 0.66 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | 8.0 | -2.6 | 32.4 | 28.5 | 22.2 | 0.14 |
| 931020 | 0700 | 0.64 | 0.113 | 0.113 | 8.87 | 8.87 | -8.0 | -10.0 | -3.0 | 28.0 | 26.8 | 18.2 | 0.17 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931020 | 1000 | 0.64 | 0.113 | 0.113 | 8.87 | 8.87 | -20.0 | -18.0 | -19.0 | 29.5 | 28.8 | 21.1 | 0.19 |
| 931020 | 1300 | 0.61 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -16.0 | -24.3 | 28.3 | 27.0 | 20.2 | 0.21 |
| 931020 | 1600 | 0.61 | 0.113 | 0.113 | 8.87 | 8.87 | -8.0 | -10.0 | -21.0 | 28.5 | 24.2 | 19.3 | 0.18 |
| 931020 | 1900 | 0.57 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -16.0 | -22.6 | 27.9 | 24.4 | 22.8 | 0.20 |
| 931020 | 2200 | 0.54 | 0.103 | 0.113 | 9.71 | 8.87 | -14.0 | -12.0 | -19.2 | 29.5 | 27.2 | 27.7 | 0.22 |
| 931021 | 0100 | 0.50 | 0.113 | 0.113 | 8.87 | 8.87 | -24.0 | -18.0 | -20.8 | 30.2 | 28.6 | 25.6 | 0.26 |
| 931021 | 0400 | 0.49 | 0.113 | 0.113 | 8.87 | 8.87 | -14.0 | -14.0 | -23.5 | 30.0 | 28.4 | 20.4 | 0.24 |
| 931021 | 0700 | 0.55 | 0.123 | 0.123 | 8.16 | 8.16 | -20.0 | -8.0 | -30.3 | 35.8 | 25.7 | 25.2 | 0.23 |
| 931021 | 1000 | 0.63 | 0.113 | 0.113 | 8.87 | 8.87 | 18.0 | -2.0 | -27.4 | 47.3 | 30.3 | 33.8 | 0.19 |
| 931021 | 1300 | 0.71 | 0.123 | 0.123 | 8.16 | 8.16 | 14.0 | 14.0 | -13.6 | 54.5 | 25.2 | 22.6 | 0.20 |
| 931021 | 1600 | 0.68 | 0.123 | 0.123 | 8.16 | 8.16 | 18.0 | 18.0 | -10.4 | 52.1 | 22.8 | 21.1 | 0.19 |
| 931021 | 1900 | 0.65 | 0.123 | 0.123 | 8.16 | 8.16 | 16.0 | -46.0 | -18.5 | 50.1 | 21.4 | 21.3 | 0.19 |
| 931021 | 2200 | 0.63 | 0.181 | 0.181 | 5.52 | 5.52 | -46.0 | -46.0 | -22.3 | 48.3 | 22.2 | 12.1 | 0.20 |
| 931022 | 0100 | 1.21 | 0.230 | 0.230 | 4.35 | 4.35 | 50.0 | 50.0 | 36.7 | 34.4 | 24.3 | 12.4 | 0.15 |
| 931022 | 0400 | 1.40 | 0.191 | 0.191 | 5.24 | 5.24 | 42.0 | 44.0 | 41.9 | 23.8 | 20.0 | 11.6 | 0.14 |
| 931022 | 0700 | 1.50 | 0.171 | 0.171 | 5.83 | 5.83 | 32.0 | 38.0 | 36.9 | 27.1 | 22.3 | 13.6 | 0.12 |
| 931022 | 1000 | 1.46 | 0.152 | 0.162 | 6.59 | 6.19 | 18.0 | 42.0 | 37.1 | 30.7 | 26.8 | 21.7 | 0.12 |
| 931022 | 1300 | 1.13 | 0.152 | 0.152 | 6.59 | 6.59 | 22.0 | 36.0 | 33.2 | 32.6 | 28.2 | 17.8 | 0.13 |
| 931022 | 1600 | 0.86 | 0.162 | 0.162 | 6.19 | 6.19 | 36.0 | 38.0 | 26.3 | 42.6 | 29.5 | 22.4 | 0.14 |
| 931022 | 1900 | 0.77 | 0.074 | 0.074 | 13.56 | 13.56 | -8.0 | 28.0 | 17.8 | 44.1 | 32.7 | 16.4 | 0.16 |
| 931022 | 2200 | 0.79 | 0.074 | 0.074 | 13.56 | 13.56 | -8.0 | -10.0 | 20.3 | 47.5 | 33.3 | 16.8 | 0.16 |
| 931023 | 0100 | 0.90 | 0.074 | 0.074 | 13.56 | 13.56 | -8.0 | -10.0 | 23.7 | 52.1 | 28.9 | 18.5 | 0.18 |
| 931023 | 0400 | 1.05 | 0.074 | 0.210 | 13.56 | 4.75 | -10.0 | 20.0 | 24.0 | 46.5 | 24.8 | 22.5 | 0.15 |
| 931023 | 0700 | 1.27 | 0.210 | 0.201 | 4.75 | 4.98 | 48.0 | 16.0 | 32.8 | 40.1 | 26.1 | 24.2 | 0.13 |
| 931023 | 1000 | 1.47 | 0.171 | 0.171 | 5.83 | 5.83 | 18.0 | 18.0 | 28.6 | 34.6 | 27.1 | 18.9 | 0.13 |
| 931023 | 1300 | 1.39 | 0.171 | 0.171 | 5.83 | 5.83 | 42.0 | 42.0 | 35.1 | 33.0 | 25.8 | 20.0 | 0.14 |
| 931023 | 1600 | 1.24 | 0.162 | 0.162 | 6.19 | 6.19 | 20.0 | 40.0 | 27.8 | 35.1 | 25.5 | 22.8 | 0.15 |
| 931023 | 1900 | 1.17 | 0.083 | 0.152 | 11.98 | 6.59 | -8.0 | 20.0 | 23.7 | 38.6 | 24.3 | 17.4 | 0.13 |
| 931023 | 2200 | 1.15 | 0.083 | 0.152 | 11.98 | 6.59 | -12.0 | 14.0 | 14.1 | 36.0 | 26.0 | 21.4 | 0.14 |
| 931024 | 0100 | 1.01 | 0.083 | 0.083 | 11.98 | 11.98 | -12.0 | -12.0 | 12.5 | 39.8 | 27.4 | 18.2 | 0.17 |
| 931024 | 0400 | 0.92 | 0.074 | 0.083 | 13.56 | 11.98 | -10.0 | -10.0 | 7.3 | 36.9 | 29.6 | 23.0 | 0.19 |
| 931024 | 0700 | 0.93 | 0.074 | 0.083 | 13.56 | 11.98 | -12.0 | -12.0 | 4.0 | 33.5 | 29.7 | 19.8 | 0.18 |
| 931024 | 1000 | 0.96 | 0.083 | 0.083 | 11.98 | 11.98 | -10.0 | -10.0 | -2.5 | 31.2 | 32.2 | 16.8 | 0.18 |
| 931024 | 1300 | 0.99 | 0.064 | 0.083 | 15.63 | 11.98 | -10.0 | -12.0 | -11.0 | 27.9 | 30.1 | 19.4 | 0.17 |
| 931024 | 1600 | 0.91 | 0.064 | 0.083 | 15.63 | 11.98 | -14.0 | -14.0 | -12.0 | 27.6 | 29.0 | 22.7 | 0.19 |
| 931024 | 1900 | 0.93 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | -12.0 | -13.5 | 23.6 | 26.9 | 12.9 | 0.20 |
| 931024 | 2200 | 0.90 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | -14.0 | -17.0 | 27.2 | 30.0 | 15.8 | 0.21 |
| 931025 | 0100 | 0.87 | 0.074 | 0.074 | 13.56 | 13.56 | -8.0 | -10.0 | -18.0 | 28.8 | 29.7 | 14.2 | 0.21 |
| 931025 | 0400 | 0.83 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | -14.0 | -24.6 | 32.2 | 29.5 | 16.3 | 0.18 |
| 931025 | 0700 | 0.88 | 0.074 | 0.074 | 13.56 | 13.56 | -14.0 | -14.0 | -20.3 | 31.4 | 25.7 | 14.0 | 0.17 |
| 931025 | 1000 | 0.93 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | -12.0 | -16.7 | 32.5 | 24.8 | 13.9 | 0.16 |
| 931025 | 1300 | 0.95 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -10.0 | -12.4 | 36.1 | 27.0 | 11.4 | 0.14 |
| 931025 | 1600 | 0.96 | 0.074 | 0.083 | 13.56 | 11.98 | -10.0 | -38.0 | -10.5 | 40.3 | 25.0 | 14.8 | 0.13 |
| 931025 | 1900 | 0.97 | 0.074 | 0.083 | 13.56 | 11.98 | -12.0 | -14.0 | -11.6 | 39.0 | 27.8 | 18.5 | 0.13 |
| 931025 | 2200 | 0.96 | 0.123 | 0.083 | 8.16 | 11.98 | -38.0 | -38.0 | -20.2 | 34.5 | 24.9 | 18.2 | 0.12 |
| 931026 | 0100 | 1.13 | 0.152 | 0.162 | 6.59 | 6.19 | -40.0 | -40.0 | -18.0 | 34.1 | 24.5 | 14.7 | 0.11 |
| 931026 | 0400 | 1.32 | 0.132 | 0.132 | 7.56 | 7.56 | -38.0 | -38.0 | -14.8 | 38.9 | 27.6 | 14.6 | 0.11 |
| 931026 | 0700 | 1.44 | 0.123 | 0.123 | 8.16 | 8.16 | -36.0 | -36.0 | -14.9 | 37.2 | 26.8 | 14.6 | 0.09 |
| 931026 | 1000 | 1.56 | 0.123 | 0.123 | 8.16 | 8.16 | -32.0 | -34.0 | -18.1 | 33.6 | 25.0 | 9.5 | 0.09 |
| 931026 | 1300 | 2.15 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -30.0 | -25.8 | 23.2 | 23.9 | 11.8 | 0.14 |
| 931026 | 1600 | 2.47 | 0.103 | 0.103 | 9.71 | 9.71 | -30.0 | -30.0 | -17.4 | 29.7 | 27.8 | 11.0 | 0.13 |
| 931026 | 1900 | 3.06 | 0.103 | 0.103 | 9.71 | 9.71 | -28.0 | -28.0 | 0.6 | 46.6 | 29.0 | 12.3 | 0.11 |
| 931026 | 2200 | 3.81 | 0.093 | 0.103 | 10.72 | 9.71 | -20.0 | -18.0 | 9.3 | 40.2 | 27.7 | 19.7 | 0.16 |
| 931027 | 0100 | 4.17 | 0.093 | 0.093 | 10.72 | 10.72 | -2.0 | 40.0 | 22.1 | 36.6 | 26.4 | 17.9 | 0.20 |
| 931027 | 0400 | 3.87 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | 6.0 | 18.9 | 33.1 | 26.9 | 24.1 | 0.20 |
| 931027 | 0700 | 3.09 | 0.093 | 0.093 | 10.72 | 10.72 | -6.0 | 10.0 | 15.0 | 29.0 | 23.5 | 19.5 | 0.15 |
| 931027 | 1000 | 2.74 | 0.093 | 0.093 | 10.72 | 10.72 | -2.0 | 0.0 | 8.8 | 22.3 | 22.3 | 17.0 | 0.12 |
| 931027 | 1300 | 2.50 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 6.0 | 10.1 | 21.3 | 21.6 | 16.9 | 0.12 |

*(Sheet 5 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,JFS}$ Hz | $T_{p,FD}$ sec | $T_{p,JFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,JDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{JDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931027 | 1600 | 2.29 | 0.093 | 0.093 | 10.72 | 10.72 | 2.0 | 2.0 | 6.3 | 19.8 | 21.0 | 14.0 | 0.14 |
| 931027 | 1900 | 1.95 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | 8.0 | 6.1 | 19.7 | 21.1 | 16.9 | 0.15 |
| 931027 | 2200 | 1.63 | 0.093 | 0.083 | 10.72 | 11.98 | -4.0 | -2.0 | 0.7 | 22.4 | 22.8 | 21.0 | 0.15 |
| 931028 | 0100 | 1.47 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 2.0 | 0.8 | 21.1 | 21.6 | 19.1 | 0.17 |
| 931028 | 0400 | 1.38 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 2.0 | 6.2 | 20.8 | 21.3 | 15.4 | 0.20 |
| 931028 | 0700 | 1.48 | 0.083 | 0.083 | 11.98 | 11.98 | 4.0 | 6.0 | 19.7 | 33.4 | 18.3 | 18.1 | 0.16 |
| 931028 | 1000 | 1.30 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 4.0 | 10.7 | 26.0 | 18.4 | 15.8 | 0.16 |
| 931028 | 1300 | 1.22 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 10.0 | 12.7 | 21.1 | 18.9 | 17.5 | 0.15 |
| 931028 | 1600 | 1.30 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 0.0 | 6.6 | 20.4 | 19.1 | 15.0 | 0.17 |
| 931028 | 1900 | 1.19 | 0.093 | 0.093 | 10.72 | 10.72 | -8.0 | -4.0 | -0.1 | 24.3 | 21.9 | 18.5 | 0.17 |
| 931028 | 2200 | 1.21 | 0.083 | 0.083 | 11.98 | 11.98 | -12.0 | -10.0 | -1.9 | 20.6 | 18.7 | 16.4 | 0.15 |
| 931029 | 0100 | 1.02 | 0.083 | 0.083 | 11.98 | 11.98 | -10.0 | -10.0 | -3.8 | 21.7 | 21.9 | 14.8 | 0.17 |
| 931029 | 0400 | 0.93 | 0.093 | 0.093 | 10.72 | 10.72 | -12.0 | -10.0 | -3.4 | 21.7 | 24.4 | 16.6 | 0.19 |
| 931029 | 0700 | 0.77 | 0.093 | 0.093 | 10.72 | 10.72 | -10.0 | -10.0 | -3.1 | 21.2 | 23.3 | 20.1 | 0.21 |
| 931029 | 1000 | 0.67 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -8.0 | -5.8 | 19.6 | 21.6 | 17.5 | 0.20 |
| 931029 | 1300 | 0.63 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | 2.0 | -3.4 | 20.9 | 21.7 | 21.1 | 0.18 |
| 931029 | 1600 | 0.59 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -10.0 | -10.9 | 25.5 | 23.8 | 24.9 | 0.23 |
| 931029 | 1900 | 0.55 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -4.0 | -14.0 | 24.9 | 21.5 | 19.7 | 0.27 |
| 931029 | 2200 | 0.49 | 0.074 | 0.074 | 13.56 | 13.56 | -6.0 | -4.0 | -14.1 | 23.6 | 22.5 | 19.3 | 0.25 |
| 931030 | 0100 | 0.45 | 0.074 | 0.083 | 13.56 | 11.98 | -8.0 | -10.0 | -11.7 | 23.3 | 22.5 | 23.3 | 0.25 |
| 931030 | 0400 | 0.45 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | -8.0 | -9.4 | 27.2 | 25.9 | 23.6 | 0.31 |
| 931030 | 0700 | 0.49 | 0.074 | 0.083 | 13.56 | 11.98 | 2.0 | -2.0 | -14.0 | 26.2 | 26.0 | 24.5 | 0.23 |
| 931030 | 1000 | 1.01 | 0.250 | 0.250 | 4.01 | 4.01 | -22.0 | -24.0 | -29.5 | 28.9 | 25.7 | 21.3 | 0.16 |
| 931030 | 1300 | 0.92 | 0.210 | 0.210 | 4.75 | 4.75 | -34.0 | -26.0 | -29.3 | 30.8 | 24.7 | 20.9 | 0.15 |
| 931030 | 1600 | 1.01 | 0.123 | 0.123 | 8.16 | 8.16 | -42.0 | -42.0 | -38.0 | 20.8 | 18.0 | 9.3 | 0.15 |
| 931030 | 1900 | 0.93 | 0.123 | 0.123 | 8.16 | 8.16 | -40.0 | -40.0 | -42.5 | 19.0 | 18.4 | 5.6 | 0.16 |
| 931030 | 2200 | 0.71 | 0.123 | 0.103 | 8.16 | 9.71 | -38.0 | -38.0 | -38.0 | 28.4 | 21.9 | 16.8 | 0.16 |
| 931031 | 0100 | 0.69 | 0.103 | 0.093 | 9.71 | 10.72 | -34.0 | -38.0 | -35.9 | 26.9 | 21.5 | 30.8 | 0.14 |
| 931031 | 0400 | 0.76 | 0.113 | 0.103 | 8.87 | 9.71 | -36.0 | -36.0 | -39.7 | 23.3 | 21.9 | 16.5 | 0.16 |
| 931031 | 0700 | 0.70 | 0.113 | 0.113 | 8.87 | 8.87 | -38.0 | -38.0 | -39.8 | 25.7 | 23.2 | 10.9 | 0.17 |
| 931031 | 1000 | 0.69 | 0.103 | 0.103 | 9.71 | 9.71 | -36.0 | -38.0 | -39.5 | 40.4 | 40.2 | 11.6 | 0.15 |
| 931031 | 1300 | 0.75 | 0.132 | 0.132 | 7.56 | 7.56 | 24.0 | -40.0 | -0.9 | 63.7 | 51.3 | 59.3 | 0.12 |
| 931031 | 1600 | 0.68 | 0.113 | 0.123 | 8.87 | 8.16 | -36.0 | -40.0 | -13.9 | 65.8 | 63.3 | 63.2 | 0.16 |
| 931031 | 1900 | 0.54 | 0.113 | 0.113 | 8.87 | 8.87 | -40.0 | -42.0 | -32.9 | 64.6 | 65.3 | 58.3 | 0.20 |
| 931031 | 2200 | 0.45 | 0.113 | 0.113 | 8.87 | 8.87 | -40.0 | -42.0 | -35.7 | 54.1 | 52.2 | 49.8 | 0.20 |
| 931101 | 0100 | 0.41 | 0.113 | 0.113 | 8.87 | 8.87 | -38.0 | -38.0 | -35.1 | 45.5 | 44.3 | 47.5 | 0.19 |
| 931101 | 0400 | 0.38 | 0.103 | 0.123 | 9.71 | 8.16 | -36.0 | -38.0 | -34.5 | 46.0 | 44.5 | 51.7 | 0.20 |
| 931101 | 0700 | 0.34 | 0.123 | 0.123 | 8.16 | 8.16 | -40.0 | -38.0 | -28.6 | 54.1 | 49.9 | 56.3 | 0.20 |
| 931101 | 1300 | 0.53 | 0.269 | 0.269 | 3.72 | 3.72 | 70.0 | 68.0 | 44.2 | 35.2 | 16.4 | 6.4 | 0.20 |
| 931101 | 1600 | 0.63 | 0.240 | 0.240 | 4.17 | 4.17 | 66.0 | 66.0 | 51.0 | 25.6 | 19.1 | 11.1 | 0.15 |
| 931101 | 1900 | 0.67 | 0.210 | 0.220 | 4.75 | 4.54 | 56.0 | 56.0 | 52.8 | 23.6 | 18.2 | 10.9 | 0.17 |
| 931101 | 2200 | 0.72 | 0.220 | 0.220 | 4.54 | 4.54 | 58.0 | 62.0 | 53.4 | 21.8 | 15.3 | 11.9 | 0.16 |
| 931102 | 0100 | 0.93 | 0.181 | 0.210 | 5.52 | 4.75 | 42.0 | 56.0 | 49.7 | 23.3 | 13.4 | 11.3 | 0.14 |
| 931102 | 0400 | 1.20 | 0.162 | 0.162 | 6.19 | 6.19 | 32.0 | 34.0 | 44.6 | 20.9 | 17.9 | 10.8 | 0.13 |
| 931102 | 0700 | 1.19 | 0.171 | 0.171 | 5.83 | 5.83 | 36.0 | 52.0 | 48.0 | 22.7 | 19.6 | 15.2 | 0.15 |
| 931102 | 1000 | 1.08 | 0.152 | 0.152 | 6.59 | 6.59 | 26.0 | 28.0 | 43.3 | 26.9 | 20.7 | 12.3 | 0.16 |
| 931102 | 1300 | 0.95 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 26.0 | 37.1 | 26.6 | 21.4 | 15.1 | 0.14 |
| 931102 | 1600 | 0.93 | 0.162 | 0.162 | 6.19 | 6.19 | 30.0 | 30.0 | 34.0 | 27.5 | 22.5 | 15.1 | 0.13 |
| 931102 | 1900 | 0.83 | 0.162 | 0.162 | 6.19 | 6.19 | 26.0 | 26.0 | 36.0 | 30.3 | 25.7 | 18.2 | 0.14 |
| 931102 | 2200 | 0.71 | 0.142 | 0.152 | 7.04 | 6.59 | 22.0 | 28.0 | 37.7 | 33.4 | 27.9 | 26.1 | 0.15 |
| 931103 | 0100 | 0.62 | 0.152 | 0.152 | 6.59 | 6.59 | 22.0 | 40.0 | 30.0 | 33.3 | 27.8 | 23.6 | 0.12 |
| 931103 | 0400 | 0.55 | 0.171 | 0.162 | 5.83 | 6.19 | 38.0 | 10.0 | 23.3 | 34.6 | 30.5 | 31.1 | 0.15 |
| 931103 | 0700 | 0.50 | 0.142 | 0.181 | 7.04 | 5.52 | 6.0 | 6.0 | 11.9 | 33.9 | 33.7 | 36.1 | 0.18 |
| 931103 | 1000 | 0.41 | 0.142 | 0.152 | 7.04 | 6.59 | 12.0 | 12.0 | 8.1 | 33.5 | 33.9 | 28.6 | 0.18 |
| 931103 | 1300 | 0.36 | 0.132 | 0.132 | 7.56 | 7.56 | 12.0 | 12.0 | 7.8 | 33.4 | 33.2 | 25.8 | 0.20 |
| 931103 | 1600 | 0.30 | 0.103 | 0.113 | 9.71 | 8.87 | -6.0 | -14.0 | 5.6 | 34.6 | 35.3 | 29.5 | 0.26 |
| 931103 | 1900 | 0.25 | 0.064 | 0.113 | 15.63 | 8.87 | -12.0 | -8.0 | -6.4 | 29.2 | 30.5 | 27.6 | 0.30 |
| 931103 | 2200 | 0.21 | 0.064 | 0.113 | 15.63 | 8.87 | -14.0 | -6.0 | -11.7 | 34.6 | 35.9 | 29.6 | 0.31 |

*(Sheet 6 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931104 | 0100 | 0.21 | 0.074 | 0.074 | 13.56 | 13.56 | -10.0 | -10.0 | -8.7 | 32.2 | 32.1 | 19.9 | 0.33 |
| 931104 | 0400 | 0.23 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | 0.0 | -6.0 | 31.4 | 32.9 | 23.0 | 0.31 |
| 931104 | 0700 | 0.27 | 0.074 | 0.074 | 13.56 | 13.56 | -10.0 | -10.0 | -5.3 | 32.4 | 35.5 | 24.6 | 0.32 |
| 931104 | 1000 | 0.28 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | -12.0 | -13.7 | 34.8 | 34.4 | 20.7 | 0.28 |
| 931104 | 1300 | 0.30 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | -12.0 | -17.9 | 30.2 | 31.7 | 16.3 | 0.23 |
| 931104 | 1600 | 0.30 | 0.074 | 0.074 | 13.56 | 13.56 | -14.0 | -14.0 | -17.5 | 33.4 | 38.5 | 24.4 | 0.27 |
| 931104 | 1900 | 0.32 | 0.074 | 0.074 | 13.56 | 13.56 | -14.0 | -14.0 | -21.4 | 36.8 | 30.9 | 21.5 | 0.26 |
| 931104 | 2200 | 0.31 | 0.083 | 0.083 | 11.98 | 11.98 | -18.0 | -16.0 | -20.0 | 37.5 | 28.0 | 20.7 | 0.22 |
| 931105 | 0100 | 0.28 | 0.083 | 0.083 | 11.98 | 11.98 | -12.0 | -12.0 | -23.0 | 32.8 | 28.7 | 19.0 | 0.23 |
| 931105 | 0400 | 0.30 | 0.083 | 0.083 | 11.98 | 11.98 | -10.0 | -10.0 | -18.2 | 28.0 | 26.8 | 16.0 | 0.24 |
| 931105 | 0700 | 0.28 | 0.083 | 0.083 | 11.98 | 11.98 | -16.0 | -14.0 | -20.1 | 29.2 | 28.8 | 20.4 | 0.25 |
| 931105 | 1000 | 0.29 | 0.083 | 0.083 | 11.98 | 11.98 | -10.0 | -50.0 | -29.4 | 38.5 | 24.6 | 23.5 | 0.24 |
| 931105 | 1300 | 0.42 | 0.171 | 0.171 | 5.83 | 5.83 | -48.0 | -48.0 | -43.1 | 23.1 | 13.6 | 5.8 | 0.18 |
| 931105 | 1600 | 0.43 | 0.142 | 0.142 | 7.04 | 7.04 | -38.0 | -38.0 | -40.9 | 23.5 | 14.4 | 4.7 | 0.18 |
| 931105 | 1900 | 0.48 | 0.132 | 0.142 | 7.56 | 7.04 | -38.0 | -38.0 | -37.4 | 19.2 | 15.0 | 7.6 | 0.18 |
| 931105 | 2200 | 0.53 | 0.132 | 0.132 | 7.56 | 7.56 | -38.0 | -38.0 | -41.5 | 14.3 | 11.7 | 4.9 | 0.16 |
| 931106 | 0100 | 0.53 | 0.123 | 0.123 | 8.16 | 8.16 | -40.0 | -40.0 | -43.4 | 14.2 | 11.4 | 5.4 | 0.16 |
| 931106 | 0400 | 0.46 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -38.0 | -42.6 | 15.6 | 12.4 | 5.4 | 0.17 |
| 931106 | 0700 | 0.45 | 0.142 | 0.132 | 7.04 | 7.56 | -40.0 | -40.0 | -42.9 | 19.4 | 15.2 | 9.8 | 0.16 |
| 931106 | 1000 | 0.48 | 0.132 | 0.132 | 7.56 | 7.56 | -42.0 | -42.0 | -43.3 | 18.0 | 16.3 | 9.1 | 0.16 |
| 931106 | 1300 | 0.43 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -40.0 | -42.3 | 22.4 | 20.5 | 15.8 | 0.16 |
| 931106 | 1600 | 1.53 | 0.191 | 0.191 | 5.24 | 5.24 | 48.0 | 48.0 | 45.2 | 20.7 | 20.1 | 11.9 | 0.16 |
| 931106 | 1900 | 1.96 | 0.162 | 0.152 | 6.19 | 6.59 | 24.0 | 40.0 | 37.2 | 22.2 | 18.7 | 18.7 | 0.18 |
| 931106 | 2200 | 1.51 | 0.152 | 0.152 | 6.59 | 6.59 | 22.0 | 24.0 | 35.4 | 25.0 | 20.7 | 15.7 | 0.17 |
| 931107 | 0100 | 1.28 | 0.162 | 0.162 | 6.19 | 6.19 | 22.0 | 32.0 | 33.7 | 29.8 | 19.6 | 15.1 | 0.16 |
| 931107 | 0400 | 1.30 | 0.142 | 0.142 | 7.04 | 7.04 | 6.0 | 10.0 | 29.2 | 31.3 | 18.4 | 12.9 | 0.14 |
| 931107 | 0700 | 1.26 | 0.162 | 0.162 | 6.19 | 6.19 | 22.0 | 10.0 | 32.0 | 29.6 | 19.6 | 13.6 | 0.12 |
| 931107 | 1000 | 1.34 | 0.162 | 0.152 | 6.19 | 6.59 | 24.0 | 26.0 | 34.4 | 25.7 | 21.8 | 17.7 | 0.15 |
| 931107 | 1300 | 1.10 | 0.152 | 0.152 | 6.59 | 6.59 | 22.0 | 26.0 | 34.5 | 24.3 | 20.3 | 14.5 | 0.15 |
| 931107 | 1600 | 0.89 | 0.162 | 0.162 | 6.19 | 6.19 | 36.0 | 26.0 | 34.8 | 25.4 | 21.6 | 14.5 | 0.14 |
| 931107 | 1900 | 0.74 | 0.171 | 0.171 | 5.83 | 5.83 | 26.0 | 32.0 | 30.4 | 27.8 | 22.6 | 15.0 | 0.12 |
| 931107 | 2200 | 0.64 | 0.191 | 0.181 | 5.24 | 5.52 | 36.0 | 34.0 | 28.7 | 33.7 | 24.3 | 13.0 | 0.14 |
| 931108 | 0100 | 0.58 | 0.191 | 0.191 | 5.24 | 5.24 | 34.0 | 36.0 | 24.4 | 39.7 | 26.2 | 13.2 | 0.15 |
| 931108 | 0400 | 0.51 | 0.162 | 0.162 | 6.19 | 6.19 | 28.0 | 32.0 | 23.3 | 40.6 | 25.7 | 17.5 | 0.18 |
| 931108 | 0700 | 0.45 | 0.171 | 0.171 | 5.83 | 5.83 | 16.0 | 16.0 | 14.5 | 44.4 | 29.0 | 23.7 | 0.16 |
| 931108 | 1000 | 0.43 | 0.171 | 0.142 | 5.83 | 7.04 | 14.0 | 14.0 | 9.0 | 45.2 | 30.2 | 32.2 | 0.17 |
| 931108 | 1300 | 0.41 | 0.142 | 0.142 | 7.04 | 7.04 | -28.0 | 18.0 | 6.1 | 43.9 | 33.0 | 34.8 | 0.16 |
| 931108 | 1600 | 0.41 | 0.142 | 0.152 | 7.04 | 6.59 | -34.0 | 6.0 | 6.4 | 43.7 | 36.5 | 37.4 | 0.20 |
| 931108 | 1900 | 0.44 | 0.152 | 0.152 | 6.59 | 6.59 | -40.0 | -4.0 | -7.4 | 36.4 | 32.9 | 30.5 | 0.17 |
| 931108 | 2200 | 0.53 | 0.269 | 0.269 | 3.72 | 3.72 | 2.0 | 4.0 | -3.0 | 34.0 | 30.5 | 25.3 | 0.15 |
| 931109 | 0100 | 0.48 | 0.298 | 0.298 | 3.35 | 3.35 | 24.0 | 16.0 | 4.2 | 44.7 | 31.5 | 23.4 | 0.17 |
| 931109 | 0400 | 0.56 | 0.269 | 0.279 | 3.72 | 3.59 | 24.0 | 2.0 | 2.3 | 42.6 | 33.6 | 30.5 | 0.15 |
| 931109 | 0700 | 0.69 | 0.250 | 0.250 | 4.01 | 4.01 | -6.0 | 8.0 | 7.7 | 41.8 | 32.8 | 27.8 | 0.12 |
| 931109 | 1000 | 0.70 | 0.230 | 0.220 | 4.35 | 4.54 | 16.0 | -6.0 | 5.1 | 35.1 | 33.3 | 25.1 | 0.12 |
| 931109 | 1300 | 0.88 | 0.210 | 0.210 | 4.75 | 4.75 | 44.0 | 48.0 | 22.0 | 57.6 | 46.4 | 40.7 | 0.13 |
| 931109 | 1600 | 1.52 | 0.191 | 0.181 | 5.24 | 5.52 | 42.0 | 42.0 | 19.0 | 53.4 | 35.5 | 24.8 | 0.12 |
| 931109 | 1900 | 1.65 | 0.171 | 0.171 | 5.83 | 5.83 | 18.0 | 26.0 | 17.2 | 30.7 | 27.2 | 16.2 | 0.11 |
| 931109 | 2200 | 1.71 | 0.171 | 0.162 | 5.83 | 6.19 | 20.0 | 24.0 | 22.0 | 31.7 | 30.7 | 44.4 | 0.12 |
| 931110 | 0100 | 1.74 | 0.162 | 0.162 | 6.19 | 6.19 | 24.0 | 26.0 | 25.2 | 32.0 | 29.1 | 27.1 | 0.16 |
| 931110 | 0400 | 1.78 | 0.162 | 0.152 | 6.19 | 6.59 | 16.0 | 18.0 | 25.2 | 34.6 | 27.0 | 31.8 | 0.19 |
| 931110 | 0700 | 1.96 | 0.142 | 0.152 | 7.04 | 6.59 | 6.0 | 6.0 | 17.2 | 41.3 | 28.3 | 35.7 | 0.14 |
| 931110 | 1000 | 1.91 | 0.142 | 0.142 | 7.04 | 7.04 | 6.0 | 8.0 | 20.7 | 37.7 | 28.5 | 33.6 | 0.13 |
| 931110 | 1300 | 1.84 | 0.142 | 0.142 | 7.04 | 7.04 | 10.0 | 14.0 | 26.4 | 39.4 | 29.6 | 35.9 | 0.18 |
| 931110 | 1600 | 1.68 | 0.152 | 0.142 | 6.59 | 7.04 | 18.0 | 18.0 | 28.8 | 33.8 | 26.1 | 38.3 | 0.20 |
| 931110 | 1900 | 1.62 | 0.142 | 0.142 | 7.04 | 7.04 | 16.0 | 20.0 | 25.0 | 29.8 | 24.3 | 30.1 | 0.14 |
| 931110 | 2200 | 1.56 | 0.142 | 0.142 | 7.04 | 7.04 | 12.0 | 16.0 | 24.8 | 31.6 | 25.1 | 26.2 | 0.13 |
| 931111 | 0100 | 1.60 | 0.132 | 0.132 | 7.56 | 7.56 | 10.0 | 12.0 | 21.9 | 31.9 | 27.0 | 22.8 | 0.18 |
| 931111 | 0400 | 1.45 | 0.123 | 0.132 | 8.16 | 7.56 | 18.0 | 16.0 | 15.1 | 31.6 | 27.7 | 23.7 | 0.21 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931111 | 0700 | 1.34 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | 12.0 | 12.3 | 33.8 | 29.6 | 23.8 | 0.17 |
| 931111 | 1000 | 1.27 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | 10.0 | 7.0 | 29.2 | 27.9 | 25.8 | 0.15 |
| 931111 | 1300 | 1.21 | 0.103 | 0.103 | 9.71 | 9.71 | -2.0 | 10.0 | 11.3 | 29.8 | 29.6 | 24.4 | 0.15 |
| 931111 | 1600 | 1.21 | 0.093 | 0.093 | 10.72 | 10.72 | 10.0 | 8.0 | 8.4 | 27.7 | 28.7 | 21.5 | 0.19 |
| 931111 | 1900 | 1.08 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 2.0 | 4.4 | 21.9 | 24.2 | 13.7 | 0.19 |
| 931111 | 2200 | 1.01 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | 4.0 | 2.6 | 24.3 | 25.8 | 18.5 | 0.14 |
| 931112 | 0100 | 1.13 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 0.0 | -1.1 | 22.4 | 23.8 | 19.0 | 0.20 |
| 931112 | 0400 | 1.23 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | -4.0 | -6.2 | 22.9 | 23.9 | 20.1 | 0.25 |
| 931112 | 0700 | 1.07 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -6.0 | -9.2 | 23.1 | 23.3 | 19.3 | 0.23 |
| 931112 | 1000 | 0.90 | 0.103 | 0.103 | 9.71 | 9.71 | -2.0 | -4.0 | -8.6 | 23.6 | 23.5 | 21.3 | 0.15 |
| 931112 | 1300 | 0.86 | 0.103 | 0.103 | 9.71 | 9.71 | -2.0 | -6.0 | -7.6 | 22.5 | 22.6 | 20.2 | 0.16 |
| 931112 | 1600 | 0.83 | 0.093 | 0.103 | 10.72 | 9.71 | -6.0 | -6.0 | -11.4 | 21.9 | 22.0 | 20.2 | 0.24 |
| 931112 | 1900 | 0.82 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | -6.0 | -11.6 | 23.7 | 23.5 | 20.1 | 0.20 |
| 931112 | 2200 | 0.72 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | -12.0 | -14.2 | 22.4 | 21.9 | 20.1 | 0.14 |
| 931113 | 0100 | 0.74 | 0.103 | 0.103 | 9.71 | 9.71 | -2.0 | -16.0 | -15.1 | 24.0 | 23.6 | 20.7 | 0.18 |
| 931113 | 0400 | 0.70 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | -6.0 | -17.3 | 26.7 | 25.0 | 18.8 | 0.32 |
| 931113 | 0700 | 0.65 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -6.0 | -17.2 | 28.2 | 26.5 | 23.9 | 0.27 |
| 931113 | 1000 | 0.56 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -12.0 | -21.6 | 26.6 | 26.5 | 21.4 | 0.21 |
| 931113 | 1300 | 0.54 | 0.103 | 0.103 | 9.71 | 9.71 | -8.0 | -10.0 | -15.9 | 27.3 | 26.3 | 23.1 | 0.18 |
| 931113 | 1600 | 0.53 | 0.113 | 0.113 | 8.87 | 8.87 | -12.0 | -12.0 | -21.9 | 28.8 | 26.1 | 21.9 | 0.28 |
| 931113 | 1900 | 0.50 | 0.123 | 0.103 | 8.16 | 9.71 | -18.0 | -38.0 | -28.7 | 33.2 | 27.0 | 29.3 | 0.31 |
| 931113 | 2200 | 0.53 | 0.123 | 0.113 | 8.16 | 8.87 | -36.0 | -36.0 | -32.1 | 32.0 | 23.2 | 29.9 | 0.17 |
| 931114 | 0100 | 0.56 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -34.0 | -33.7 | 32.1 | 25.5 | 24.2 | 0.15 |
| 931114 | 0400 | 0.56 | 0.132 | 0.113 | 7.56 | 8.87 | -20.0 | -36.0 | -38.2 | 35.2 | 28.8 | 30.4 | 0.22 |
| 931114 | 0700 | 0.52 | 0.123 | 0.113 | 8.16 | 8.87 | -36.0 | -38.0 | -35.7 | 34.1 | 28.4 | 24.9 | 0.23 |
| 931114 | 1000 | 0.44 | 0.113 | 0.113 | 8.87 | 8.87 | -26.0 | -36.0 | -34.0 | 32.1 | 27.6 | 25.2 | 0.25 |
| 931114 | 1300 | 0.44 | 0.113 | 0.113 | 8.87 | 8.87 | -10.0 | -34.0 | -26.2 | 32.6 | 28.7 | 23.5 | 0.17 |
| 931114 | 1600 | 0.49 | 0.103 | 0.103 | 9.71 | 9.71 | -16.0 | -36.0 | -32.8 | 26.2 | 21.1 | 20.1 | 0.26 |
| 931114 | 1900 | 0.50 | 0.103 | 0.103 | 9.71 | 9.71 | -32.0 | -38.0 | -32.8 | 26.7 | 21.6 | 22.0 | 0.27 |
| 931114 | 2200 | 0.48 | 0.103 | 0.103 | 9.71 | 9.71 | -30.0 | -36.0 | -35.9 | 23.2 | 21.2 | 22.0 | 0.21 |
| 931115 | 0100 | 0.49 | 0.113 | 0.103 | 8.87 | 9.71 | -28.0 | -36.0 | -30.1 | 23.3 | 19.4 | 21.0 | 0.16 |
| 931115 | 0400 | 0.52 | 0.103 | 0.103 | 9.71 | 9.71 | -28.0 | -36.0 | -36.6 | 22.6 | 19.1 | 21.7 | 0.23 |
| 931115 | 0700 | 0.54 | 0.162 | 0.103 | 6.19 | 9.71 | -42.0 | -50.0 | -41.2 | 25.1 | 15.6 | 20.5 | 0.24 |
| 931115 | 1000 | 0.50 | 0.191 | 0.103 | 5.24 | 9.71 | -50.0 | -50.0 | -41.7 | 25.9 | 13.9 | 20.0 | 0.23 |
| 931115 | 1300 | 0.48 | 0.191 | 0.103 | 5.24 | 9.71 | -48.0 | -48.0 | -40.4 | 24.8 | 13.4 | 22.3 | 0.13 |
| 931115 | 1600 | 0.52 | 0.181 | 0.103 | 5.52 | 9.71 | -46.0 | -44.0 | -40.9 | 24.7 | 13.5 | 22.6 | 0.19 |
| 931115 | 1900 | 0.50 | 0.152 | 0.162 | 6.59 | 6.19 | -42.0 | -42.0 | -42.6 | 26.8 | 15.9 | 9.0 | 0.21 |
| 931115 | 2200 | 0.49 | 0.152 | 0.093 | 6.59 | 10.72 | -44.0 | -44.0 | -41.2 | 29.8 | 17.7 | 26.2 | 0.20 |
| 931116 | 0100 | 0.44 | 0.152 | 0.103 | 6.59 | 9.71 | -42.0 | -38.0 | -38.1 | 27.4 | 18.4 | 20.3 | 0.17 |
| 931116 | 0400 | 0.48 | 0.162 | 0.103 | 6.19 | 9.71 | -42.0 | -40.0 | -32.7 | 28.2 | 22.9 | 23.5 | 0.21 |
| 931116 | 0700 | 1.05 | 0.220 | 0.220 | 4.54 | 4.54 | 40.0 | 36.0 | 32.8 | 33.4 | 29.5 | 21.0 | 0.14 |
| 931116 | 1000 | 1.07 | 0.201 | 0.191 | 4.98 | 5.24 | 44.0 | 46.0 | 34.1 | 34.3 | 27.6 | 23.6 | 0.15 |
| 931116 | 1300 | 1.17 | 0.152 | 0.181 | 6.59 | 5.52 | 14.0 | 14.0 | 30.7 | 31.5 | 25.2 | 23.2 | 0.12 |
| 931116 | 1600 | 1.09 | 0.171 | 0.171 | 5.83 | 5.83 | 12.0 | 12.0 | 26.6 | 34.4 | 28.7 | 16.3 | 0.11 |
| 931116 | 1900 | 1.05 | 0.171 | 0.171 | 5.83 | 5.83 | 24.0 | 24.0 | 23.7 | 36.1 | 31.2 | 20.5 | 0.14 |
| 931116 | 2200 | 0.95 | 0.152 | 0.152 | 6.59 | 6.59 | 18.0 | 22.0 | 21.4 | 44.9 | 29.7 | 24.1 | 0.16 |
| 931117 | 0100 | 0.84 | 0.162 | 0.132 | 6.19 | 7.56 | 16.0 | 26.0 | 16.8 | 48.4 | 28.6 | 19.8 | 0.13 |
| 931117 | 0400 | 0.79 | 0.142 | 0.142 | 7.04 | 7.04 | -10.0 | -12.0 | 10.2 | 49.2 | 30.8 | 18.8 | 0.11 |
| 931117 | 0700 | 0.77 | 0.142 | 0.142 | 7.04 | 7.04 | -16.0 | 2.0 | 9.6 | 47.2 | 33.4 | 19.4 | 0.18 |
| 931117 | 1000 | 0.68 | 0.142 | 0.113 | 7.04 | 8.87 | 2.0 | 2.0 | 7.1 | 42.3 | 35.3 | 27.8 | 0.20 |
| 931117 | 1300 | 0.60 | 0.113 | 0.123 | 8.87 | 8.16 | -26.0 | -26.0 | -1.3 | 41.7 | 35.9 | 26.5 | 0.16 |
| 931117 | 1600 | 0.57 | 0.113 | 0.132 | 8.87 | 7.56 | -26.0 | -14.0 | -15.1 | 38.4 | 39.4 | 24.7 | 0.15 |
| 931117 | 1900 | 0.59 | 0.123 | 0.113 | 8.16 | 8.87 | -38.0 | -38.0 | -39.1 | 45.0 | 37.3 | 27.1 | 0.16 |
| 931117 | 2200 | 0.61 | 0.181 | 0.181 | 5.52 | 5.52 | -54.0 | -56.0 | -50.3 | 33.5 | 21.1 | 11.3 | 0.18 |
| 931118 | 0100 | 0.56 | 0.171 | 0.123 | 5.83 | 8.16 | -54.0 | -44.0 | -47.9 | 28.1 | 15.7 | 18.1 | 0.20 |
| 931118 | 0400 | 0.45 | 0.132 | 0.113 | 7.56 | 8.87 | -40.0 | -38.0 | -45.2 | 28.3 | 18.3 | 17.3 | 0.19 |
| 931118 | 0700 | 0.89 | 0.230 | 0.240 | 4.35 | 4.17 | 58.0 | 58.0 | 42.2 | 21.9 | 19.1 | 14.5 | 0.18 |
| 931118 | 1000 | 1.58 | 0.181 | 0.181 | 5.52 | 5.52 | 48.0 | 48.0 | 45.8 | 15.7 | 16.0 | 10.9 | 0.20 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931118 | 1300 | 1.56 | 0.171 | 0.171 | 5.83 | 5.83 | 42.0 | 44.0 | 41.4 | 21.3 | 20.2 | 15.4 | 0.18 |
| 931118 | 1600 | 1.67 | 0.162 | 0.152 | 6.19 | 6.59 | 30.0 | 32.0 | 35.6 | 21.7 | 20.7 | 15.0 | 0.15 |
| 931118 | 1900 | 1.64 | 0.162 | 0.152 | 6.19 | 6.59 | 26.0 | 24.0 | 30.5 | 25.4 | 25.9 | 16.5 | 0.14 |
| 931118 | 2200 | 1.56 | 0.152 | 0.152 | 6.59 | 6.59 | 34.0 | 24.0 | 30.2 | 30.6 | 30.7 | 16.0 | 0.13 |
| 931119 | 0100 | 1.33 | 0.132 | 0.152 | 7.56 | 6.59 | 16.0 | 14.0 | 26.0 | 33.7 | 31.9 | 23.8 | 0.13 |
| 931119 | 0400 | 1.23 | 0.142 | 0.132 | 7.04 | 7.56 | 14.0 | 12.0 | 21.8 | 30.3 | 28.8 | 24.0 | 0.11 |
| 931119 | 0700 | 1.22 | 0.152 | 0.152 | 6.59 | 6.59 | 8.0 | 12.0 | 15.7 | 31.7 | 30.2 | 18.5 | 0.13 |
| 931119 | 1000 | 1.27 | 0.142 | 0.142 | 7.04 | 7.04 | 10.0 | 12.0 | 16.1 | 38.0 | 36.1 | 23.1 | 0.16 |
| 931119 | 1300 | 1.14 | 0.142 | 0.142 | 7.04 | 7.04 | 14.0 | 12.0 | 17.6 | 38.1 | 37.0 | 22.3 | 0.17 |
| 931119 | 1600 | 1.07 | 0.123 | 0.123 | 8.16 | 8.16 | 6.0 | 8.0 | 15.0 | 33.8 | 35.1 | 23.4 | 0.14 |
| 931119 | 1900 | 1.07 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 4.0 | 11.1 | 28.6 | 31.0 | 15.9 | 0.16 |
| 931119 | 2200 | 0.87 | 0.113 | 0.113 | 8.87 | 8.87 | 0.0 | 4.0 | 11.0 | 35.2 | 37.4 | 21.8 | 0.27 |
| 931120 | 0100 | 0.74 | 0.103 | 0.103 | 9.71 | 9.71 | 10.0 | 10.0 | 11.4 | 37.9 | 40.0 | 28.0 | 0.28 |
| 931120 | 0400 | 0.60 | 0.103 | 0.103 | 9.71 | 9.71 | 6.0 | 6.0 | -2.1 | 35.8 | 36.9 | 30.4 | 0.26 |
| 931120 | 0700 | 0.54 | 0.113 | 0.113 | 8.87 | 8.87 | 4.0 | 4.0 | -6.2 | 35.7 | 34.8 | 31.6 | 0.24 |
| 931120 | 1000 | 0.51 | 0.123 | 0.113 | 8.16 | 8.87 | 8.0 | -38.0 | -14.7 | 41.3 | 38.4 | 35.8 | 0.26 |
| 931120 | 1300 | 0.53 | 0.103 | 0.113 | 9.71 | 8.87 | -34.0 | -36.0 | -2.8 | 53.0 | 35.3 | 37.2 | 0.28 |
| 931120 | 1600 | 0.54 | 0.113 | 0.113 | 8.87 | 8.87 | 8.0 | 56.0 | 8.7 | 64.0 | 31.7 | 35.1 | 0.24 |
| 931120 | 1900 | 0.65 | 0.298 | 0.113 | 3.35 | 8.87 | 60.0 | 58.0 | 24.7 | 59.6 | 25.8 | 33.2 | 0.20 |
| 931120 | 2200 | 0.86 | 0.181 | 0.191 | 5.52 | 5.24 | 40.0 | 42.0 | 36.6 | 35.5 | 19.7 | 8.8 | 0.16 |
| 931121 | 0100 | 1.06 | 0.181 | 0.181 | 5.52 | 5.52 | 42.0 | 44.0 | 39.2 | 28.1 | 21.3 | 13.8 | 0.18 |
| 931121 | 0400 | 1.31 | 0.152 | 0.171 | 6.59 | 5.83 | 22.0 | 28.0 | 32.8 | 24.5 | 21.0 | 16.8 | 0.15 |
| 931121 | 0700 | 1.21 | 0.142 | 0.152 | 7.04 | 6.59 | 20.0 | 24.0 | 27.9 | 26.0 | 22.9 | 14.0 | 0.13 |
| 931121 | 1000 | 1.05 | 0.152 | 0.152 | 6.59 | 6.59 | 26.0 | 28.0 | 25.0 | 28.1 | 25.4 | 12.6 | 0.13 |
| 931121 | 1300 | 0.87 | 0.162 | 0.171 | 6.19 | 5.83 | 30.0 | 28.0 | 21.8 | 32.7 | 27.9 | 16.7 | 0.15 |
| 931121 | 1600 | 0.74 | 0.113 | 0.191 | 8.87 | 5.24 | -34.0 | 32.0 | 22.4 | 41.7 | 31.7 | 23.0 | 0.15 |
| 931121 | 1900 | 0.73 | 0.162 | 0.123 | 6.19 | 8.16 | 32.0 | 30.0 | 14.7 | 47.0 | 39.8 | 33.7 | 0.13 |
| 931121 | 2200 | 0.75 | 0.123 | 0.240 | 8.16 | 4.17 | -34.0 | -10.0 | -6.7 | 45.6 | 47.0 | 59.3 | 0.14 |
| 931122 | 0100 | 0.74 | 0.123 | 0.240 | 8.16 | 4.17 | -34.0 | -14.0 | -16.7 | 43.7 | 44.5 | 48.1 | 0.15 |
| 931122 | 0400 | 0.74 | 0.201 | 0.201 | 4.98 | 4.98 | -50.0 | -36.0 | -37.6 | 41.8 | 41.6 | 40.8 | 0.14 |
| 931122 | 0700 | 0.70 | 0.123 | 0.113 | 8.16 | 8.87 | -34.0 | -36.0 | -37.1 | 34.8 | 35.0 | 24.0 | 0.14 |
| 931122 | 1000 | 0.69 | 0.132 | 0.113 | 7.56 | 8.87 | -36.0 | -36.0 | -36.5 | 33.3 | 32.9 | 24.5 | 0.14 |
| 931122 | 1300 | 0.66 | 0.123 | 0.113 | 8.16 | 8.87 | -36.0 | -38.0 | -33.1 | 32.7 | 32.8 | 26.5 | 0.17 |
| 931122 | 1600 | 0.69 | 0.113 | 0.113 | 8.87 | 8.87 | -34.0 | -38.0 | -25.9 | 32.2 | 31.3 | 20.6 | 0.18 |
| 931122 | 1900 | 0.79 | 0.113 | 0.113 | 8.87 | 8.87 | -38.0 | -38.0 | -20.8 | 34.5 | 29.7 | 25.8 | 0.15 |
| 931122 | 2200 | 0.92 | 0.113 | 0.113 | 8.87 | 8.87 | -26.0 | -38.0 | -24.9 | 31.9 | 27.6 | 24.3 | 0.14 |
| 931123 | 0100 | 1.06 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -36.0 | -19.5 | 32.2 | 27.3 | 23.9 | 0.13 |
| 931123 | 0400 | 1.17 | 0.113 | 0.113 | 8.87 | 8.87 | -28.0 | -14.0 | -12.5 | 32.8 | 27.2 | 18.6 | 0.12 |
| 931123 | 0700 | 1.33 | 0.132 | 0.132 | 7.56 | 7.56 | -34.0 | -4.0 | -8.3 | 29.3 | 27.9 | 23.2 | 0.10 |
| 931123 | 1000 | 1.41 | 0.132 | 0.132 | 7.56 | 7.56 | -4.0 | -4.0 | -8.0 | 29.9 | 30.2 | 23.8 | 0.09 |
| 931123 | 1300 | 1.44 | 0.113 | 0.123 | 8.87 | 8.16 | -22.0 | -22.0 | -8.8 | 29.8 | 30.3 | 22.6 | 0.11 |
| 931123 | 1600 | 1.39 | 0.123 | 0.123 | 8.16 | 8.16 | -8.0 | -16.0 | -4.3 | 31.6 | 30.5 | 22.1 | 0.13 |
| 931123 | 1900 | 1.39 | 0.113 | 0.113 | 8.87 | 8.87 | -10.0 | -10.0 | -6.7 | 27.9 | 28.6 | 21.3 | 0.11 |
| 931123 | 2200 | 1.51 | 0.113 | 0.113 | 8.87 | 8.87 | -10.0 | -10.0 | 1.2 | 31.7 | 26.9 | 20.8 | 0.11 |
| 931124 | 0100 | 1.64 | 0.113 | 0.113 | 8.87 | 8.87 | -14.0 | -14.0 | 4.1 | 33.6 | 29.7 | 21.6 | 0.13 |
| 931124 | 0400 | 1.52 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -10.0 | 0.9 | 29.4 | 29.5 | 19.2 | 0.13 |
| 931124 | 0700 | 1.56 | 0.113 | 0.113 | 8.87 | 8.87 | -14.0 | -12.0 | -5.4 | 26.6 | 27.3 | 21.7 | 0.11 |
| 931124 | 1000 | 1.52 | 0.113 | 0.113 | 8.87 | 8.87 | -6.0 | -8.0 | -4.7 | 24.3 | 25.4 | 22.0 | 0.10 |
| 931124 | 1300 | 1.33 | 0.113 | 0.113 | 8.87 | 8.87 | -6.0 | -8.0 | -7.3 | 29.4 | 27.6 | 23.6 | 0.13 |
| 931124 | 1600 | 1.27 | 0.103 | 0.113 | 9.71 | 8.87 | -8.0 | -8.0 | -3.7 | 30.9 | 27.2 | 26.7 | 0.14 |
| 931124 | 1900 | 1.16 | 0.113 | 0.113 | 8.87 | 8.87 | -12.0 | -10.0 | -5.7 | 30.8 | 26.0 | 19.3 | 0.12 |
| 931124 | 2200 | 1.14 | 0.113 | 0.123 | 8.87 | 8.16 | -2.0 | -6.0 | -1.3 | 31.7 | 28.1 | 25.6 | 0.11 |
| 931125 | 0100 | 1.40 | 0.123 | 0.123 | 8.16 | 8.16 | -8.0 | -6.0 | 11.1 | 46.5 | 27.7 | 22.9 | 0.15 |
| 931125 | 0400 | 1.59 | 0.191 | 0.191 | 5.24 | 5.24 | 14.0 | 32.0 | 10.2 | 41.8 | 27.9 | 22.2 | 0.12 |
| 931125 | 0700 | 1.72 | 0.162 | 0.162 | 6.19 | 6.19 | 2.0 | 2.0 | 14.6 | 35.6 | 27.9 | 19.0 | 0.11 |
| 931125 | 1000 | 2.03 | 0.152 | 0.152 | 6.59 | 6.59 | 16.0 | 10.0 | 16.8 | 33.6 | 28.1 | 21.4 | 0.10 |
| 931125 | 1300 | 2.30 | 0.132 | 0.132 | 7.56 | 7.56 | 10.0 | 12.0 | 19.2 | 31.9 | 28.7 | 25.0 | 0.12 |
| 931125 | 1600 | 2.96 | 0.123 | 0.123 | 8.16 | 8.16 | 18.0 | 16.0 | 20.3 | 26.8 | 27.2 | 19.2 | 0.16 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931125 | 1900 | 3.29 | 0.123 | 0.113 | 8.16 | 8.87 | 10.0 | 12.0 | 17.1 | 26.4 | 26.5 | 22.8 | 0.16 |
| 931125 | 2200 | 3.28 | 0.132 | 0.093 | 7.56 | 10.72 | 12.0 | 12.0 | 12.9 | 26.0 | 26.2 | 18.1 | 0.15 |
| 931126 | 0100 | 2.75 | 0.093 | 0.093 | 10.72 | 10.72 | -2.0 | 10.0 | 12.2 | 30.4 | 28.9 | 23.1 | 0.14 |
| 931126 | 0400 | 2.35 | 0.103 | 0.093 | 9.71 | 10.72 | 12.0 | 10.0 | 12.7 | 31.7 | 30.5 | 24.5 | 0.15 |
| 931126 | 0700 | 2.11 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | -4.0 | 12.4 | 31.9 | 29.6 | 16.5 | 0.15 |
| 931126 | 1000 | 1.93 | 0.093 | 0.103 | 10.72 | 9.71 | -2.0 | 0.0 | 10.0 | 30.2 | 29.8 | 25.9 | 0.11 |
| 931126 | 1300 | 1.95 | 0.123 | 0.103 | 8.16 | 9.71 | 8.0 | 6.0 | 5.8 | 31.0 | 30.9 | 26.0 | 0.12 |
| 931126 | 1600 | 1.98 | 0.142 | 0.103 | 7.04 | 9.71 | 10.0 | 8.0 | 10.1 | 32.3 | 30.7 | 26.1 | 0.13 |
| 931126 | 1900 | 1.89 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | 6.0 | 7.4 | 32.0 | 30.4 | 24.2 | 0.13 |
| 931126 | 2200 | 1.81 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | 6.0 | 9.4 | 32.7 | 31.3 | 22.4 | 0.11 |
| 931127 | 0100 | 1.83 | 0.142 | 0.103 | 7.04 | 9.71 | 4.0 | 6.0 | 9.1 | 31.8 | 34.1 | 24.9 | 0.12 |
| 931127 | 0400 | 1.99 | 0.123 | 0.123 | 8.16 | 8.16 | 6.0 | -6.0 | -4.9 | 32.7 | 35.4 | 28.2 | 0.14 |
| 931127 | 0700 | 2.51 | 0.123 | 0.113 | 8.16 | 8.87 | -14.0 | -12.0 | -11.6 | 31.9 | 33.4 | 29.8 | 0.15 |
| 931127 | 1000 | 2.64 | 0.103 | 0.103 | 9.71 | 9.71 | -16.0 | -10.0 | -13.4 | 31.4 | 32.3 | 25.8 | 0.16 |
| 931127 | 1300 | 2.76 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -16.0 | -20.1 | 32.3 | 32.3 | 25.8 | 0.17 |
| 931127 | 1600 | 2.89 | 0.103 | 0.103 | 9.71 | 9.71 | -22.0 | -18.0 | -21.5 | 31.0 | 31.0 | 26.6 | 0.20 |
| 931127 | 1900 | 2.91 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -16.0 | -23.3 | 30.8 | 30.6 | 24.0 | 0.22 |
| 931127 | 2200 | 3.14 | 0.093 | 0.093 | 10.72 | 10.72 | -10.0 | -16.0 | -17.4 | 25.9 | 26.9 | 25.0 | 0.22 |
| 931128 | 0100 | 3.45 | 0.093 | 0.093 | 10.72 | 10.72 | -18.0 | -16.0 | -23.9 | 24.5 | 25.4 | 23.7 | 0.24 |
| 931128 | 0400 | 3.49 | 0.093 | 0.093 | 10.72 | 10.72 | -12.0 | -16.0 | -23.9 | 28.1 | 26.9 | 25.4 | 0.27 |
| 931128 | 0700 | 3.14 | 0.093 | 0.093 | 10.72 | 10.72 | -36.0 | -18.0 | -25.0 | 24.9 | 25.7 | 23.5 | 0.23 |
| 931128 | 1000 | 2.80 | 0.083 | 0.083 | 11.98 | 11.98 | -18.0 | -20.0 | -19.7 | 21.3 | 22.1 | 22.0 | 0.22 |
| 931128 | 1300 | 2.65 | 0.093 | 0.083 | 10.72 | 11.98 | -32.0 | -14.0 | -18.5 | 24.0 | 23.4 | 24.3 | 0.19 |
| 931128 | 1600 | 2.49 | 0.083 | 0.093 | 11.98 | 10.72 | -8.0 | -12.0 | -12.8 | 25.6 | 26.1 | 29.1 | 0.18 |
| 931128 | 1900 | 2.28 | 0.093 | 0.093 | 10.72 | 10.72 | -16.0 | -12.0 | -14.1 | 27.0 | 27.3 | 24.8 | 0.19 |
| 931128 | 2200 | 1.95 | 0.093 | 0.093 | 10.72 | 10.72 | -28.0 | -18.0 | -24.3 | 24.0 | 24.2 | 22.2 | 0.16 |
| 931129 | 0100 | 1.78 | 0.083 | 0.093 | 11.98 | 10.72 | -32.0 | -14.0 | -14.8 | 27.7 | 26.6 | 26.0 | 0.12 |
| 931129 | 0400 | 1.76 | 0.093 | 0.083 | 10.72 | 11.98 | -22.0 | -20.0 | -8.6 | 30.0 | 27.4 | 26.5 | 0.14 |
| 931129 | 0700 | 1.65 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | -14.0 | -3.7 | 29.2 | 28.7 | 25.2 | 0.20 |
| 931129 | 1000 | 1.57 | 0.093 | 0.093 | 10.72 | 10.72 | -12.0 | -14.0 | -4.0 | 29.9 | 27.5 | 22.8 | 0.15 |
| 931129 | 1300 | 1.54 | 0.093 | 0.093 | 10.72 | 10.72 | -10.0 | -12.0 | 2.2 | 30.4 | 29.8 | 24.7 | 0.12 |
| 931129 | 1600 | 1.57 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | -8.0 | 0.2 | 29.1 | 28.5 | 22.7 | 0.14 |
| 931129 | 1900 | 1.34 | 0.093 | 0.093 | 10.72 | 10.72 | -8.0 | -8.0 | -5.6 | 29.1 | 27.8 | 25.0 | 0.17 |
| 931129 | 2200 | 1.26 | 0.093 | 0.093 | 10.72 | 10.72 | 2.0 | -6.0 | -0.9 | 28.6 | 27.6 | 27.5 | 0.17 |
| 931130 | 0100 | 1.26 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | -4.0 | -8.4 | 28.4 | 26.8 | 26.1 | 0.14 |
| 931130 | 0400 | 1.25 | 0.093 | 0.093 | 10.72 | 10.72 | -6.0 | -8.0 | -6.9 | 27.5 | 26.8 | 25.2 | 0.18 |
| 931130 | 0700 | 1.24 | 0.093 | 0.093 | 10.72 | 10.72 | -14.0 | -18.0 | -5.7 | 35.0 | 26.8 | 27.9 | 0.25 |
| 931130 | 1000 | 1.71 | 0.181 | 0.093 | 5.52 | 10.72 | 46.0 | 48.0 | 29.5 | 47.2 | 22.5 | 29.5 | 0.18 |
| 931130 | 1300 | 1.63 | 0.162 | 0.093 | 6.19 | 10.72 | 28.0 | 40.0 | 24.1 | 45.4 | 21.9 | 28.8 | 0.17 |
| 931130 | 1600 | 1.53 | 0.093 | 0.093 | 10.72 | 10.72 | 2.0 | 36.0 | 19.5 | 48.7 | 23.1 | 27.9 | 0.17 |
| 931130 | 1900 | 1.53 | 0.103 | 0.093 | 9.71 | 10.72 | -10.0 | 30.0 | 19.8 | 45.1 | 23.8 | 27.7 | 0.16 |
| 931130 | 2200 | 1.62 | 0.171 | 0.103 | 5.83 | 9.71 | 22.0 | 28.0 | 17.8 | 37.9 | 24.6 | 27.7 | 0.13 |
| 931201 | 0100 | 1.61 | 0.171 | 0.171 | 5.83 | 5.83 | 22.0 | 18.0 | 16.7 | 38.2 | 24.9 | 20.7 | 0.13 |
| 931201 | 0400 | 1.58 | 0.162 | 0.171 | 6.19 | 5.83 | 22.0 | 14.0 | 19.1 | 39.4 | 26.8 | 21.5 | 0.10 |
| 931201 | 0700 | 1.66 | 0.162 | 0.162 | 6.19 | 6.19 | 18.0 | 20.0 | 18.5 | 35.6 | 26.1 | 17.3 | 0.13 |
| 931201 | 1000 | 1.70 | 0.171 | 0.171 | 5.83 | 5.83 | 16.0 | 16.0 | 16.6 | 33.7 | 25.3 | 19.3 | 0.13 |
| 931201 | 1300 | 1.75 | 0.162 | 0.162 | 6.19 | 6.19 | 16.0 | 12.0 | 13.8 | 31.0 | 23.6 | 15.6 | 0.10 |
| 931201 | 1600 | 1.74 | 0.162 | 0.162 | 6.19 | 6.19 | 14.0 | 4.0 | 11.4 | 31.7 | 24.2 | 17.5 | 0.11 |
| 931201 | 1900 | 1.81 | 0.142 | 0.152 | 7.04 | 6.59 | 6.0 | 6.0 | 13.3 | 30.7 | 25.0 | 22.1 | 0.13 |
| 931201 | 2200 | 1.69 | 0.142 | 0.142 | 7.04 | 7.04 | 8.0 | 8.0 | 10.6 | 26.7 | 23.8 | 13.5 | 0.12 |
| 931202 | 0100 | 1.80 | 0.152 | 0.103 | 6.59 | 9.71 | 8.0 | 6.0 | 11.5 | 27.1 | 24.4 | 23.6 | 0.10 |
| 931202 | 0400 | 1.75 | 0.113 | 0.113 | 8.87 | 8.87 | -2.0 | 0.0 | 9.0 | 29.4 | 27.4 | 22.0 | 0.11 |
| 931202 | 0700 | 1.71 | 0.113 | 0.103 | 8.87 | 9.71 | -18.0 | 4.0 | 7.9 | 30.1 | 29.0 | 25.7 | 0.13 |
| 931202 | 1000 | 1.59 | 0.103 | 0.103 | 9.71 | 9.71 | 2.0 | 2.0 | 6.3 | 30.6 | 29.7 | 26.6 | 0.13 |
| 931202 | 1300 | 1.51 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 4.0 | 7.4 | 29.4 | 27.9 | 24.2 | 0.11 |
| 931202 | 1600 | 1.56 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | 4.0 | 4.8 | 29.7 | 26.8 | 21.6 | 0.12 |
| 931202 | 1900 | 1.62 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | -6.0 | 3.1 | 28.7 | 25.0 | 19.4 | 0.14 |
| 931202 | 2200 | 1.48 | 0.103 | 0.103 | 9.71 | 9.71 | -8.0 | 4.0 | 3.4 | 27.9 | 26.6 | 20.7 | 0.14 |

*(Sheet 10 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931203 | 0100 | 1.41 | 0.103 | 0.103 | 9.71 | 9.71 | -8.0 | -8.0 | -0.8 | 26.2 | 25.7 | 19.0 | 0.12 |
| 931203 | 0400 | 1.34 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -4.0 | -1.9 | 26.8 | 26.5 | 22.2 | 0.12 |
| 931203 | 0700 | 1.20 | 0.103 | 0.103 | 9.71 | 9.71 | 2.0 | -8.0 | -1.9 | 28.5 | 27.3 | 25.1 | 0.16 |
| 931203 | 1000 | 1.01 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -4.0 | -1.6 | 30.0 | 28.6 | 23.8 | 0.19 |
| 931203 | 1300 | 0.90 | 0.113 | 0.113 | 8.87 | 8.87 | -10.0 | 4.0 | -0.2 | 29.7 | 27.6 | 23.0 | 0.15 |
| 931203 | 1600 | 0.87 | 0.113 | 0.113 | 8.87 | 8.87 | 0.0 | -2.0 | 1.2 | 29.1 | 27.5 | 23.5 | 0.12 |
| 931203 | 1900 | 0.84 | 0.113 | 0.113 | 8.87 | 8.87 | -4.0 | -2.0 | -2.1 | 31.6 | 29.0 | 27.4 | 0.21 |
| 931203 | 2200 | 0.78 | 0.113 | 0.113 | 8.87 | 8.87 | -10.0 | -12.0 | -4.4 | 32.0 | 29.2 | 24.0 | 0.22 |
| 931204 | 0100 | 0.76 | 0.113 | 0.113 | 8.87 | 8.87 | -8.0 | -10.0 | -7.3 | 30.0 | 28.9 | 25.3 | 0.19 |
| 931204 | 0400 | 0.76 | 0.113 | 0.113 | 8.87 | 8.87 | -6.0 | -6.0 | -7.6 | 29.7 | 29.3 | 26.7 | 0.16 |
| 931204 | 0700 | 0.73 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -18.0 | -12.8 | 30.3 | 30.6 | 27.6 | 0.20 |
| 931204 | 1000 | 0.71 | 0.113 | 0.113 | 8.87 | 8.87 | -6.0 | -6.0 | -8.6 | 32.3 | 32.5 | 29.9 | 0.23 |
| 931204 | 1300 | 0.65 | 0.113 | 0.113 | 8.87 | 8.87 | -4.0 | -8.0 | -6.3 | 33.9 | 34.2 | 28.7 | 0.22 |
| 931204 | 1600 | 0.65 | 0.113 | 0.113 | 8.87 | 8.87 | -12.0 | -14.0 | -17.0 | 31.5 | 31.9 | 28.1 | 0.17 |
| 931204 | 1900 | 0.66 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -22.0 | -25.7 | 32.1 | 32.5 | 29.1 | 0.18 |
| 931204 | 2200 | 0.68 | 0.103 | 0.113 | 9.71 | 8.87 | -16.0 | -20.0 | -27.9 | 36.9 | 30.4 | 31.0 | 0.25 |
| 931205 | 0100 | 0.73 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -40.0 | -28.2 | 36.2 | 24.9 | 26.1 | 0.22 |
| 931205 | 0400 | 0.89 | 0.123 | 0.113 | 8.16 | 8.87 | -38.0 | -40.0 | -39.1 | 29.6 | 27.6 | 30.4 | 0.17 |
| 931205 | 0700 | 1.11 | 0.123 | 0.113 | 8.16 | 8.87 | -38.0 | -40.0 | -34.4 | 23.5 | 20.4 | 25.9 | 0.20 |
| 931205 | 1000 | 0.94 | 0.132 | 0.113 | 7.56 | 8.87 | -38.0 | -40.0 | -39.7 | 24.7 | 18.9 | 20.3 | 0.27 |
| 931205 | 1300 | 0.75 | 0.103 | 0.103 | 9.71 | 9.71 | -36.0 | 68.0 | -1.7 | 98.9 | 23.9 | 28.7 | 0.39 |
| 931205 | 1600 | 0.97 | 0.181 | 0.181 | 5.52 | 5.52 | 50.0 | 54.0 | 39.6 | 19.9 | 13.5 | 5.6 | 0.21 |
| 931205 | 1900 | 0.99 | 0.181 | 0.181 | 5.52 | 5.52 | 48.0 | 48.0 | 44.5 | 20.3 | 13.2 | 5.1 | 0.22 |
| 931205 | 2200 | 1.12 | 0.162 | 0.142 | 6.19 | 7.04 | 42.0 | 42.0 | 38.4 | 28.4 | 14.0 | 11.1 | 0.23 |
| 931206 | 0100 | 1.38 | 0.132 | 0.132 | 7.56 | 7.56 | 20.0 | 20.0 | 33.8 | 25.8 | 13.9 | 6.7 | 0.20 |
| 931206 | 0400 | 1.27 | 0.132 | 0.113 | 7.56 | 8.87 | 20.0 | 22.0 | 28.6 | 24.5 | 18.1 | 17.1 | 0.17 |
| 931206 | 0700 | 1.21 | 0.123 | 0.123 | 8.16 | 8.16 | 18.0 | 18.0 | 24.8 | 23.3 | 19.6 | 14.4 | 0.15 |
| 931206 | 1000 | 1.09 | 0.103 | 0.103 | 9.71 | 9.71 | 16.0 | 18.0 | 25.8 | 25.9 | 23.0 | 22.1 | 0.18 |
| 931206 | 1300 | 0.95 | 0.103 | 0.103 | 9.71 | 9.71 | 14.0 | 16.0 | 21.4 | 28.3 | 23.5 | 20.2 | 0.20 |
| 931206 | 1600 | 0.87 | 0.103 | 0.103 | 9.71 | 9.71 | 6.0 | 12.0 | 16.7 | 25.6 | 23.0 | 17.9 | 0.20 |
| 931206 | 1900 | 0.86 | 0.093 | 0.093 | 10.72 | 10.72 | 12.0 | 12.0 | 14.2 | 23.3 | 22.9 | 17.1 | 0.14 |
| 931206 | 2200 | 0.87 | 0.103 | 0.103 | 9.71 | 9.71 | 10.0 | 10.0 | 11.8 | 21.4 | 20.9 | 12.1 | 0.22 |
| 931207 | 0100 | 0.81 | 0.103 | 0.103 | 9.71 | 9.71 | 14.0 | 14.0 | 10.6 | 22.6 | 22.1 | 18.2 | 0.25 |
| 931207 | 0400 | 0.89 | 0.093 | 0.103 | 10.72 | 9.71 | 2.0 | 54.0 | 24.9 | 40.2 | 17.5 | 18.5 | 0.23 |
| 931207 | 0700 | 1.33 | 0.191 | 0.191 | 5.24 | 5.24 | 48.0 | 50.0 | 39.9 | 31.0 | 16.8 | 10.7 | 0.20 |
| 931207 | 1000 | 1.32 | 0.181 | 0.181 | 5.52 | 5.52 | 46.0 | 50.0 | 39.3 | 30.3 | 19.3 | 13.6 | 0.20 |
| 931207 | 1300 | 1.11 | 0.171 | 0.171 | 5.83 | 5.83 | 34.0 | 34.0 | 29.1 | 35.9 | 20.8 | 13.2 | 0.16 |
| 931207 | 1600 | 0.93 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | 32.0 | 23.3 | 37.4 | 21.9 | 19.6 | 0.15 |
| 931207 | 1900 | 0.88 | 0.083 | 0.093 | 11.98 | 10.72 | -6.0 | -4.0 | 16.0 | 36.0 | 22.6 | 20.1 | 0.13 |
| 931207 | 2200 | 0.84 | 0.093 | 0.093 | 10.72 | 10.72 | -10.0 | -10.0 | 9.8 | 35.7 | 25.8 | 26.6 | 0.15 |
| 931208 | 0100 | 0.77 | 0.093 | 0.093 | 10.72 | 10.72 | 4.0 | -12.0 | 7.7 | 31.8 | 27.9 | 21.1 | 0.24 |
| 931208 | 0400 | 0.71 | 0.093 | 0.093 | 10.72 | 10.72 | -14.0 | -12.0 | 4.5 | 29.3 | 28.8 | 21.2 | 0.20 |
| 931208 | 0700 | 0.67 | 0.093 | 0.093 | 10.72 | 10.72 | -14.0 | 6.0 | 1.2 | 29.2 | 28.9 | 20.9 | 0.16 |
| 931208 | 1000 | 0.65 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 0.0 | 5.0 | 26.3 | 27.2 | 18.6 | 0.19 |
| 931208 | 1300 | 0.60 | 0.093 | 0.093 | 10.72 | 10.72 | -16.0 | -2.0 | -3.0 | 26.1 | 27.6 | 20.0 | 0.28 |
| 931208 | 1600 | 0.56 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | -6.0 | -4.1 | 24.4 | 25.2 | 17.8 | 0.37 |
| 931208 | 1900 | 0.53 | 0.103 | 0.103 | 9.71 | 9.71 | -10.0 | -10.0 | -3.4 | 24.9 | 25.8 | 19.9 | 0.16 |
| 931208 | 2200 | 0.60 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -10.0 | 8.2 | 39.1 | 23.5 | 21.8 | 0.19 |
| 931209 | 0100 | 0.69 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | 50.0 | 25.9 | 50.4 | 22.2 | 20.6 | 0.19 |
| 931209 | 0400 | 0.69 | 0.240 | 0.103 | 4.17 | 9.71 | 46.0 | 48.0 | 26.3 | 48.1 | 22.3 | 21.5 | 0.16 |
| 931209 | 0700 | 0.64 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 28.0 | 22.6 | 42.1 | 23.6 | 24.8 | 0.13 |
| 931209 | 1000 | 0.58 | 0.240 | 0.113 | 4.17 | 8.87 | 48.0 | 32.0 | 17.6 | 45.6 | 25.5 | 27.6 | 0.13 |
| 931209 | 1300 | 0.53 | 0.103 | 0.113 | 9.71 | 8.87 | 2.0 | 2.0 | 12.4 | 46.2 | 26.6 | 30.7 | 0.19 |
| 931209 | 1600 | 0.48 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 6.0 | 12.2 | 40.8 | 30.2 | 33.1 | 0.20 |
| 931209 | 1900 | 0.47 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 0.0 | 4.9 | 37.7 | 30.0 | 32.7 | 0.18 |
| 931209 | 2200 | 0.48 | 0.113 | 0.113 | 8.87 | 8.87 | -20.0 | 4.0 | -0.2 | 33.3 | 29.3 | 29.3 | 0.18 |
| 931210 | 0100 | 0.47 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | 2.0 | -6.3 | 31.7 | 31.5 | 26.2 | 0.22 |
| 931210 | 0400 | 0.46 | 0.103 | 0.113 | 9.71 | 8.87 | 2.0 | 2.0 | -13.0 | 30.6 | 30.4 | 29.9 | 0.22 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931210 | 0700 | 0.47 | 0.113 | 0.103 | 8.87 | 9.71 | -16.0 | -12.0 | -11.9 | 29.2 | 28.7 | 26.5 | 0.24 |
| 931210 | 1000 | 0.49 | 0.103 | 0.113 | 9.71 | 8.87 | -4.0 | -4.0 | -7.9 | 28.8 | 27.1 | 28.9 | 0.17 |
| 931210 | 1300 | 0.54 | 0.113 | 0.113 | 8.87 | 8.87 | -12.0 | -14.0 | -14.1 | 34.7 | 25.4 | 25.1 | 0.23 |
| 931210 | 1600 | 0.52 | 0.103 | 0.113 | 9.71 | 8.87 | -14.0 | -14.0 | -15.6 | 35.2 | 27.0 | 26.2 | 0.25 |
| 931210 | 1900 | 0.50 | 0.103 | 0.103 | 9.71 | 9.71 | -22.0 | -2.0 | -20.9 | 37.7 | 27.3 | 26.8 | 0.30 |
| 931210 | 2200 | 0.52 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | -10.0 | -27.7 | 41.0 | 24.3 | 22.3 | 0.17 |
| 931211 | 0100 | 0.53 | 0.201 | 0.074 | 4.98 | 13.56 | -50.0 | -52.0 | -31.3 | 42.3 | 19.4 | 23.7 | 0.24 |
| 931211 | 0400 | 0.48 | 0.074 | 0.074 | 13.56 | 13.56 | -4.0 | -40.0 | -28.7 | 39.3 | 22.3 | 20.6 | 0.22 |
| 931211 | 0700 | 0.80 | 0.210 | 0.269 | 4.75 | 3.72 | 44.0 | 52.0 | 31.1 | 47.0 | 18.8 | 15.5 | 0.25 |
| 931211 | 1000 | 1.39 | 0.171 | 0.171 | 5.83 | 5.83 | 40.0 | 40.0 | 39.9 | 19.2 | 15.4 | 8.6 | 0.20 |
| 931211 | 1300 | 1.35 | 0.152 | 0.152 | 6.59 | 6.59 | 32.0 | 38.0 | 35.8 | 21.9 | 15.1 | 9.7 | 0.21 |
| 931211 | 1600 | 1.50 | 0.152 | 0.152 | 6.59 | 6.59 | 30.0 | 38.0 | 38.3 | 24.6 | 14.3 | 9.6 | 0.27 |
| 931211 | 1900 | 1.76 | 0.152 | 0.152 | 6.59 | 6.59 | 32.0 | 40.0 | 36.3 | 21.3 | 14.2 | 10.5 | 0.27 |
| 931211 | 2200 | 1.63 | 0.142 | 0.142 | 7.04 | 7.04 | 24.0 | 36.0 | 34.5 | 21.1 | 12.7 | 8.9 | 0.23 |
| 931212 | 0100 | 1.66 | 0.142 | 0.142 | 7.04 | 7.04 | 24.0 | 24.0 | 33.5 | 23.2 | 12.6 | 11.9 | 0.25 |
| 931212 | 0400 | 1.79 | 0.132 | 0.132 | 7.56 | 7.56 | 22.0 | 24.0 | 36.3 | 23.8 | 13.0 | 9.1 | 0.27 |
| 931212 | 0700 | 1.82 | 0.123 | 0.132 | 8.16 | 7.56 | 22.0 | 52.0 | 34.8 | 23.9 | 12.7 | 10.9 | 0.27 |
| 931212 | 1000 | 1.74 | 0.132 | 0.132 | 7.56 | 7.56 | 22.0 | 24.0 | 32.9 | 22.3 | 13.8 | 10.7 | 0.22 |
| 931212 | 1300 | 1.62 | 0.132 | 0.132 | 7.56 | 7.56 | 22.0 | 22.0 | 31.2 | 23.5 | 15.6 | 9.0 | 0.18 |
| 931212 | 1600 | 1.55 | 0.132 | 0.142 | 7.56 | 7.04 | 22.0 | 24.0 | 31.8 | 24.6 | 15.4 | 12.4 | 0.22 |
| 931212 | 1900 | 1.54 | 0.132 | 0.132 | 7.56 | 7.56 | 26.0 | 26.0 | 30.5 | 23.7 | 16.2 | 10.3 | 0.20 |
| 931212 | 2200 | 1.59 | 0.142 | 0.132 | 7.04 | 7.56 | 24.0 | 24.0 | 29.1 | 24.8 | 16.6 | 12.8 | 0.17 |
| 931213 | 0100 | 1.63 | 0.142 | 0.132 | 7.04 | 7.56 | 24.0 | 24.0 | 24.2 | 25.9 | 19.4 | 18.1 | 0.14 |
| 931213 | 0400 | 1.63 | 0.142 | 0.142 | 7.04 | 7.04 | 24.0 | 24.0 | 24.7 | 26.3 | 19.1 | 10.0 | 0.18 |
| 931213 | 0700 | 1.67 | 0.142 | 0.142 | 7.04 | 7.04 | 24.0 | 24.0 | 25.5 | 24.3 | 19.1 | 13.9 | 0.19 |
| 931213 | 1000 | 1.70 | 0.074 | 0.074 | 13.56 | 13.56 | -10.0 | 22.0 | 22.8 | 28.3 | 18.6 | 19.2 | 0.15 |
| 931213 | 1300 | 1.69 | 0.074 | 0.074 | 13.56 | 13.56 | -2.0 | 22.0 | 21.5 | 30.1 | 19.8 | 17.4 | 0.15 |
| 931213 | 1600 | 1.62 | 0.074 | 0.083 | 13.56 | 11.98 | -14.0 | 18.0 | 16.0 | 26.9 | 20.0 | 20.1 | 0.15 |
| 931213 | 1900 | 1.54 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | 10.0 | 16.1 | 26.3 | 20.3 | 22.6 | 0.21 |
| 931213 | 2200 | 1.66 | 0.083 | 0.083 | 11.98 | 11.98 | 10.0 | 14.0 | 13.0 | 24.0 | 20.1 | 21.3 | 0.15 |
| 931214 | 0100 | 1.88 | 0.083 | 0.083 | 11.98 | 11.98 | 10.0 | 12.0 | 12.8 | 20.9 | 20.5 | 18.0 | 0.13 |
| 931214 | 0400 | 1.86 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | 10.0 | 12.4 | 20.2 | 19.4 | 17.4 | 0.17 |
| 931214 | 0700 | 1.91 | 0.074 | 0.074 | 13.56 | 13.56 | 6.0 | 10.0 | 12.0 | 20.1 | 20.6 | 16.2 | 0.24 |
| 931214 | 1000 | 1.96 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | 8.0 | 9.4 | 21.8 | 21.9 | 16.1 | 0.18 |
| 931214 | 1300 | 1.87 | 0.083 | 0.083 | 11.98 | 11.98 | 10.0 | 8.0 | 9.3 | 22.4 | 22.8 | 21.7 | 0.13 |
| 931214 | 1600 | 1.84 | 0.083 | 0.083 | 11.98 | 11.98 | 6.0 | 4.0 | 6.0 | 23.5 | 22.8 | 21.6 | 0.14 |
| 931214 | 1900 | 1.82 | 0.083 | 0.083 | 11.98 | 11.98 | 4.0 | 4.0 | 4.8 | 23.4 | 23.6 | 22.2 | 0.16 |
| 931214 | 2200 | 1.70 | 0.093 | 0.093 | 10.72 | 10.72 | 2.0 | 2.0 | 1.4 | 23.8 | 23.0 | 20.1 | 0.15 |
| 931215 | 0100 | 1.68 | 0.093 | 0.083 | 10.72 | 11.98 | -2.0 | 0.0 | 7.1 | 24.2 | 23.6 | 21.1 | 0.12 |
| 931215 | 0400 | 1.85 | 0.103 | 0.083 | 9.71 | 11.98 | 2.0 | 4.0 | 14.6 | 29.1 | 26.0 | 22.2 | 0.12 |
| 931215 | 0700 | 1.83 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 12.0 | 23.9 | 33.2 | 26.3 | 18.7 | 0.15 |
| 931215 | 1000 | 2.05 | 0.152 | 0.142 | 6.59 | 7.04 | 26.0 | 8.0 | 23.0 | 31.7 | 27.1 | 22.7 | 0.15 |
| 931215 | 1300 | 1.82 | 0.142 | 0.142 | 7.04 | 7.04 | 8.0 | 10.0 | 18.3 | 33.9 | 31.0 | 26.8 | 0.13 |
| 931215 | 1600 | 1.33 | 0.123 | 0.132 | 8.16 | 7.56 | -42.0 | 10.0 | 3.0 | 46.6 | 47.9 | 35.4 | 0.12 |
| 931215 | 1900 | 1.41 | 0.123 | 0.123 | 8.16 | 8.16 | 10.0 | 12.0 | 20.5 | 49.0 | 47.4 | 26.4 | 0.16 |
| 931215 | 2200 | 1.39 | 0.123 | 0.123 | 8.16 | 8.16 | 6.0 | 10.0 | 21.3 | 45.9 | 45.4 | 38.9 | 0.19 |
| 931216 | 0100 | 1.99 | 0.162 | 0.132 | 6.19 | 7.56 | 38.0 | 38.0 | 34.8 | 24.4 | 16.2 | 21.1 | 0.22 |
| 931216 | 0400 | 2.50 | 0.123 | 0.123 | 8.16 | 8.16 | 16.0 | 20.0 | 28.3 | 25.1 | 16.7 | 13.2 | 0.22 |
| 931216 | 0700 | 2.98 | 0.103 | 0.103 | 9.71 | 9.71 | 10.0 | 18.0 | 26.5 | 25.3 | 19.8 | 15.8 | 0.23 |
| 931216 | 1000 | 2.90 | 0.103 | 0.103 | 9.71 | 9.71 | 10.0 | 12.0 | 26.1 | 27.1 | 20.0 | 14.1 | 0.21 |
| 931216 | 1300 | 2.71 | 0.093 | 0.093 | 10.72 | 10.72 | 10.0 | 14.0 | 23.6 | 26.3 | 20.2 | 14.8 | 0.19 |
| 931216 | 1600 | 2.62 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | 12.0 | 21.3 | 25.9 | 20.9 | 14.6 | 0.18 |
| 931216 | 1900 | 2.62 | 0.083 | 0.083 | 11.98 | 11.98 | 10.0 | 10.0 | 19.7 | 24.1 | 20.8 | 16.6 | 0.19 |
| 931216 | 2200 | 2.60 | 0.083 | 0.083 | 11.98 | 11.98 | 10.0 | 12.0 | 19.2 | 23.9 | 20.8 | 15.6 | 0.21 |
| 931217 | 0100 | 2.74 | 0.074 | 0.074 | 13.56 | 13.56 | 2.0 | 4.0 | 14.6 | 23.7 | 22.4 | 14.5 | 0.17 |
| 931217 | 0400 | 2.79 | 0.074 | 0.074 | 13.56 | 13.56 | 6.0 | 6.0 | 9.2 | 23.2 | 23.3 | 19.1 | 0.15 |
| 931217 | 0700 | 3.12 | 0.074 | 0.074 | 13.56 | 13.56 | -4.0 | 8.0 | 2.3 | 22.3 | 23.0 | 21.8 | 0.18 |
| 931217 | 1000 | 3.55 | 0.074 | 0.064 | 13.56 | 15.63 | 10.0 | 2.0 | 2.9 | 21.0 | 21.3 | 21.6 | 0.20 |

*(Sheet 12 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931217 | 1300 | 3.49 | 0.064 | 0.064 | 15.63 | 15.63 | -10.0 | 0.0 | -1.8 | 19.8 | 19.5 | 21.6 | 0.17 |
| 931217 | 1600 | 2.90 | 0.074 | 0.074 | 13.56 | 13.56 | 10.0 | 6.0 | 5.9 | 19.0 | 18.8 | 19.7 | 0.14 |
| 931217 | 1900 | 2.57 | 0.064 | 0.064 | 15.63 | 15.63 | 4.0 | 2.0 | 4.7 | 19.7 | 19.9 | 16.2 | 0.18 |
| 931217 | 2200 | 2.51 | 0.064 | 0.064 | 15.63 | 15.63 | 6.0 | 2.0 | 2.3 | 20.1 | 20.6 | 18.2 | 0.18 |
| 931218 | 0100 | 2.57 | 0.074 | 0.064 | 13.56 | 15.63 | -4.0 | -2.0 | -0.7 | 18.6 | 19.0 | 20.5 | 0.20 |
| 931218 | 0400 | 2.38 | 0.074 | 0.074 | 13.56 | 13.56 | 6.0 | 4.0 | 3.3 | 18.9 | 18.9 | 18.5 | 0.18 |
| 931218 | 0700 | 2.28 | 0.074 | 0.074 | 13.56 | 13.56 | 2.0 | 2.0 | 2.6 | 22.4 | 22.5 | 21.1 | 0.18 |
| 931218 | 1000 | 2.30 | 0.074 | 0.074 | 13.56 | 13.56 | 0.0 | 0.0 | -1.3 | 23.5 | 23.7 | 25.2 | 0.19 |
| 931218 | 1300 | 2.21 | 0.074 | 0.074 | 13.56 | 13.56 | 8.0 | 2.0 | 2.9 | 23.7 | 23.8 | 24.5 | 0.20 |
| 931218 | 1600 | 2.07 | 0.074 | 0.074 | 13.56 | 13.56 | 6.0 | 4.0 | -1.5 | 22.0 | 21.7 | 21.1 | 0.18 |
| 931218 | 1900 | 1.88 | 0.064 | 0.074 | 15.63 | 13.56 | -8.0 | -8.0 | 1.1 | 23.6 | 23.5 | 26.0 | 0.19 |
| 931218 | 2200 | 1.74 | 0.074 | 0.074 | 13.56 | 13.56 | 6.0 | -8.0 | 0.1 | 24.5 | 24.0 | 25.9 | 0.19 |
| 931219 | 0100 | 1.56 | 0.074 | 0.074 | 13.56 | 13.56 | 6.0 | -4.0 | 0.8 | 23.1 | 22.5 | 23.9 | 0.23 |
| 931219 | 0400 | 1.36 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | 2.0 | 1.2 | 23.3 | 23.1 | 23.2 | 0.26 |
| 931219 | 0700 | 1.24 | 0.083 | 0.074 | 11.98 | 13.56 | 6.0 | 6.0 | 3.9 | 24.3 | 24.7 | 24.8 | 0.23 |
| 931219 | 1000 | 1.13 | 0.074 | 0.074 | 13.56 | 13.56 | 2.0 | -2.0 | 4.5 | 26.5 | 26.3 | 24.8 | 0.42 |
| 931219 | 1300 | 1.00 | 0.074 | 0.074 | 13.56 | 13.56 | -10.0 | -8.0 | 0.5 | 24.0 | 23.8 | 20.9 | 0.35 |
| 931219 | 1600 | 0.95 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | -6.0 | 2.3 | 25.3 | 25.0 | 22.5 | 0.21 |
| 931219 | 1900 | 0.90 | 0.083 | 0.083 | 11.98 | 11.98 | -2.0 | -2.0 | -2.6 | 25.5 | 25.4 | 21.8 | 0.24 |
| 931219 | 2200 | 0.83 | 0.074 | 0.083 | 13.56 | 11.98 | 2.0 | 2.0 | 3.2 | 32.6 | 31.1 | 29.3 | 0.35 |
| 931220 | 0100 | 0.72 | 0.083 | 0.083 | 11.98 | 11.98 | 0.0 | 2.0 | 2.7 | 35.1 | 32.0 | 24.9 | 0.32 |
| 931220 | 0400 | 0.71 | 0.083 | 0.083 | 11.98 | 11.98 | 4.0 | 0.0 | 1.2 | 30.5 | 27.9 | 24.0 | 0.27 |
| 931220 | 0700 | 0.65 | 0.083 | 0.083 | 11.98 | 11.98 | -4.0 | -2.0 | -4.0 | 33.4 | 28.7 | 24.1 | 0.23 |
| 931220 | 1000 | 0.62 | 0.083 | 0.083 | 11.98 | 11.98 | -2.0 | -16.0 | -2.4 | 32.7 | 28.9 | 23.6 | 0.33 |
| 931220 | 1300 | 0.60 | 0.083 | 0.083 | 11.98 | 11.98 | -14.0 | -10.0 | -7.2 | 31.8 | 30.9 | 24.2 | 0.24 |
| 931220 | 1600 | 0.57 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -10.0 | -5.9 | 31.9 | 30.1 | 25.0 | 0.26 |
| 931220 | 1900 | 0.55 | 0.093 | 0.083 | 10.72 | 11.98 | -6.0 | -8.0 | -3.9 | 34.4 | 32.4 | 24.3 | 0.27 |
| 931220 | 2200 | 0.61 | 0.083 | 0.083 | 11.98 | 11.98 | -6.0 | -6.0 | -2.9 | 37.1 | 36.4 | 23.3 | 0.26 |
| 931221 | 0100 | 0.69 | 0.162 | 0.318 | 6.19 | 3.15 | -44.0 | -44.0 | -31.8 | 38.1 | 32.0 | 24.5 | 0.21 |
| 931221 | 0400 | 1.13 | 0.162 | 0.142 | 6.19 | 7.04 | -46.0 | -44.0 | -39.5 | 25.3 | 21.3 | 19.9 | 0.15 |
| 931221 | 0700 | 0.85 | 0.142 | 0.132 | 7.04 | 7.56 | -40.0 | -40.0 | -31.8 | 30.1 | 24.4 | 23.4 | 0.16 |
| 931221 | 1000 | 0.86 | 0.103 | 0.103 | 9.71 | 9.71 | -38.0 | -38.0 | -32.4 | 27.8 | 26.5 | 22.0 | 0.19 |
| 931221 | 1300 | 0.68 | 0.103 | 0.103 | 9.71 | 9.71 | -36.0 | -38.0 | -23.0 | 36.1 | 31.7 | 30.3 | 0.27 |
| 931221 | 1600 | 0.65 | 0.123 | 0.103 | 8.16 | 9.71 | -36.0 | 72.0 | 7.2 | 91.7 | 25.5 | 31.9 | 0.22 |
| 931221 | 1900 | 0.66 | 0.230 | 0.103 | 4.35 | 9.71 | 62.0 | 68.0 | 25.4 | 79.5 | 21.8 | 30.0 | 0.22 |
| 931221 | 2200 | 0.65 | 0.279 | 0.103 | 3.59 | 9.71 | 88.0 | 88.0 | 36.3 | 85.5 | 24.5 | 33.7 | 0.32 |
| 931222 | 0100 | 0.56 | 0.289 | 0.103 | 3.47 | 9.71 | 90.0 | 90.0 | 18.7 | 95.8 | 25.4 | 25.1 | 0.40 |
| 931222 | 0400 | 0.55 | 0.289 | 0.103 | 3.47 | 9.71 | 90.0 | 90.0 | 5.6 | 57.8 | 29.8 | 31.9 | 0.38 |
| 931222 | 0700 | 0.56 | 0.103 | 0.103 | 9.71 | 9.71 | -22.0 | -24.0 | 1.0 | 43.7 | 30.3 | 29.7 | 0.27 |
| 931222 | 1000 | 0.56 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | -10.0 | -3.3 | 41.0 | 31.9 | 29.8 | 0.33 |
| 931222 | 1300 | 0.57 | 0.103 | 0.103 | 9.71 | 9.71 | -16.0 | -8.0 | -3.9 | 35.9 | 33.0 | 30.1 | 0.39 |
| 931222 | 1600 | 0.52 | 0.113 | 0.103 | 8.87 | 9.71 | -34.0 | -34.0 | -4.1 | 36.8 | 31.4 | 24.2 | 0.37 |
| 931222 | 1900 | 0.53 | 0.113 | 0.103 | 8.87 | 9.71 | -26.0 | -10.0 | -7.8 | 32.0 | 28.2 | 24.1 | 0.32 |
| 931222 | 2200 | 0.54 | 0.123 | 0.064 | 8.16 | 15.63 | -34.0 | -8.0 | -12.2 | 32.2 | 26.9 | 22.2 | 0.31 |
| 931223 | 0100 | 0.54 | 0.064 | 0.064 | 15.63 | 15.63 | -8.0 | -10.0 | -8.4 | 32.5 | 28.7 | 21.5 | 0.40 |
| 931223 | 0400 | 0.51 | 0.113 | 0.113 | 8.87 | 8.87 | -24.0 | -10.0 | -10.1 | 34.1 | 28.0 | 19.3 | 0.35 |
| 931223 | 0700 | 0.62 | 0.064 | 0.064 | 15.63 | 15.63 | -12.0 | 90.0 | 18.0 | 73.1 | 25.7 | 17.1 | 0.35 |
| 931223 | 1000 | 0.86 | 0.210 | 0.220 | 4.75 | 4.54 | 54.0 | 54.0 | 34.7 | 50.0 | 23.7 | 19.1 | 0.21 |
| 931223 | 1300 | 1.09 | 0.191 | 0.191 | 5.24 | 5.24 | 52.0 | 52.0 | 45.5 | 22.8 | 17.5 | 10.6 | 0.26 |
| 931223 | 1600 | 1.11 | 0.171 | 0.181 | 5.83 | 5.52 | 44.0 | 46.0 | 43.2 | 21.6 | 15.7 | 8.9 | 0.24 |
| 931223 | 1900 | 1.02 | 0.171 | 0.171 | 5.83 | 5.83 | 34.0 | 38.0 | 33.3 | 27.8 | 17.1 | 14.0 | 0.17 |
| 931223 | 2200 | 1.15 | 0.152 | 0.152 | 6.59 | 6.59 | 14.0 | 14.0 | 25.1 | 24.3 | 17.5 | 10.5 | 0.14 |
| 931224 | 0100 | 1.21 | 0.132 | 0.132 | 7.56 | 7.56 | 14.0 | 14.0 | 22.3 | 20.5 | 19.2 | 10.5 | 0.15 |
| 931224 | 0400 | 1.10 | 0.132 | 0.132 | 7.56 | 7.56 | 14.0 | 16.0 | 17.4 | 25.6 | 18.6 | 11.0 | 0.16 |
| 931224 | 0700 | 0.98 | 0.103 | 0.103 | 9.71 | 9.71 | -2.0 | 10.0 | 15.8 | 27.5 | 20.0 | 15.5 | 0.15 |
| 931224 | 1000 | 1.05 | 0.103 | 0.103 | 9.71 | 9.71 | 6.0 | 10.0 | 9.9 | 25.4 | 21.1 | 17.1 | 0.12 |
| 931224 | 1300 | 1.07 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 6.0 | 11.7 | 25.7 | 23.7 | 19.3 | 0.16 |
| 931224 | 1600 | 0.98 | 0.093 | 0.093 | 10.72 | 10.72 | 10.0 | 2.0 | 11.9 | 26.2 | 23.7 | 22.1 | 0.25 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 931224 | 1900 | 0.97 | 0.093 | 0.093 | 10.72 | 10.72 | -2.0 | 0.0 | 4.7 | 21.9 | 22.2 | 17.5 | 0.17 |
| 931224 | 2200 | 0.92 | 0.093 | 0.093 | 10.72 | 10.72 | 2.0 | 4.0 | 6.8 | 23.0 | 23.9 | 18.4 | 0.14 |
| 931225 | 0100 | 0.79 | 0.093 | 0.093 | 10.72 | 10.72 | -10.0 | -10.0 | 3.1 | 26.3 | 27.0 | 21.3 | 0.25 |
| 931225 | 0400 | 0.74 | 0.093 | 0.093 | 10.72 | 10.72 | -8.0 | -4.0 | 2.2 | 26.0 | 25.9 | 20.7 | 0.24 |
| 931225 | 0700 | 0.71 | 0.093 | 0.093 | 10.72 | 10.72 | -14.0 | -4.0 | -6.5 | 24.2 | 24.0 | 22.0 | 0.29 |
| 931225 | 1000 | 0.62 | 0.093 | 0.093 | 10.72 | 10.72 | -2.0 | 8.0 | 4.8 | 24.2 | 24.0 | 22.6 | 0.23 |
| 931225 | 1300 | 0.59 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 4.0 | -2.9 | 25.1 | 26.0 | 22.0 | 0.38 |
| 931225 | 1600 | 0.56 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 6.0 | 5.3 | 25.0 | 26.5 | 22.7 | 0.33 |
| 931225 | 1900 | 0.51 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | 6.0 | 3.8 | 24.0 | 25.1 | 19.5 | 0.37 |
| 931225 | 2200 | 0.44 | 0.093 | 0.093 | 10.72 | 10.72 | 10.0 | 8.0 | -4.8 | 26.8 | 26.7 | 24.5 | 0.33 |
| 931226 | 0100 | 0.40 | 0.132 | 0.093 | 7.56 | 10.72 | -40.0 | -42.0 | -18.3 | 45.7 | 25.8 | 25.1 | 0.26 |
| 931226 | 0400 | 0.43 | 0.123 | 0.093 | 8.16 | 10.72 | -42.0 | 70.0 | 27.4 | 85.9 | 22.5 | 26.9 | 0.28 |
| 931226 | 0700 | 0.53 | 0.210 | 0.230 | 4.75 | 4.35 | 60.0 | 66.0 | 40.9 | 41.5 | 15.2 | 5.4 | 0.31 |
| 931226 | 1000 | 0.42 | 0.259 | 0.093 | 3.86 | 10.72 | 68.0 | 66.0 | 20.5 | 83.5 | 23.4 | 31.7 | 0.23 |
| 931226 | 1300 | 0.35 | 0.113 | 0.093 | 8.87 | 10.72 | -36.0 | -38.0 | -0.7 | 71.6 | 32.9 | 27.6 | 0.27 |
| 931226 | 1600 | 0.31 | 0.132 | 0.132 | 7.56 | 7.56 | -38.0 | -38.0 | -9.4 | 47.1 | 43.8 | 42.8 | 0.28 |
| 931226 | 1900 | 0.29 | 0.132 | 0.103 | 7.56 | 9.71 | -38.0 | -38.0 | -35.2 | 42.2 | 34.8 | 36.5 | 0.27 |
| 931226 | 2200 | 0.29 | 0.123 | 0.123 | 8.16 | 8.16 | -36.0 | -38.0 | -39.3 | 32.1 | 20.0 | 30.1 | 0.18 |
| 931227 | 0100 | 0.25 | 0.181 | 0.103 | 5.52 | 9.71 | -44.0 | -46.0 | -38.2 | 30.0 | 18.7 | 25.5 | 0.27 |
| 931227 | 0400 | 0.25 | 0.142 | 0.132 | 7.04 | 7.56 | -40.0 | -40.0 | -39.2 | 29.0 | 20.4 | 8.3 | 0.30 |
| 931227 | 0700 | 0.28 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -40.0 | -40.0 | 28.0 | 20.7 | 7.2 | 0.27 |
| 931227 | 1000 | 0.26 | 0.132 | 0.132 | 7.56 | 7.56 | -38.0 | -38.0 | -35.7 | 36.7 | 33.4 | 19.8 | 0.22 |
| 931227 | 1300 | 0.30 | 0.132 | 0.132 | 7.56 | 7.56 | -38.0 | -38.0 | -21.6 | 47.9 | 46.2 | 20.7 | 0.20 |
| 931227 | 1600 | 0.44 | 0.181 | 0.181 | 5.52 | 5.52 | 36.0 | 36.0 | 13.3 | 63.7 | 43.4 | 10.0 | 0.21 |
| 931227 | 1900 | 0.59 | 0.181 | 0.171 | 5.52 | 5.83 | 36.0 | 36.0 | 28.4 | 30.4 | 31.6 | 22.6 | 0.19 |
| 931227 | 2200 | 0.69 | 0.162 | 0.162 | 6.19 | 6.19 | 32.0 | 32.0 | 43.3 | 36.1 | 22.7 | 17.8 | 0.14 |
| 931228 | 0100 | 0.74 | 0.152 | 0.152 | 6.59 | 6.59 | 16.0 | 16.0 | 38.2 | 35.2 | 21.0 | 13.2 | 0.15 |
| 931228 | 0400 | 0.80 | 0.152 | 0.152 | 6.59 | 6.59 | 20.0 | 20.0 | 38.0 | 32.0 | 26.3 | 14.4 | 0.18 |
| 931228 | 0700 | 0.79 | 0.162 | 0.181 | 6.19 | 5.52 | 24.0 | 28.0 | 36.9 | 30.6 | 23.5 | 21.8 | 0.18 |
| 931228 | 1000 | 0.79 | 0.181 | 0.181 | 5.52 | 5.52 | 40.0 | 52.0 | 39.8 | 32.7 | 20.9 | 16.1 | 0.19 |
| 931228 | 1300 | 0.96 | 0.181 | 0.181 | 5.52 | 5.52 | 46.0 | 46.0 | 39.5 | 27.2 | 20.5 | 18.4 | 0.20 |
| 931228 | 1600 | 1.26 | 0.171 | 0.171 | 5.83 | 5.83 | 42.0 | 40.0 | 39.0 | 19.1 | 17.8 | 12.1 | 0.20 |
| 931228 | 1900 | 1.53 | 0.152 | 0.152 | 6.59 | 6.59 | 26.0 | 38.0 | 32.0 | 16.1 | 15.7 | 11.3 | 0.18 |
| 931228 | 2200 | 1.84 | 0.152 | 0.152 | 6.59 | 6.59 | 28.0 | 26.0 | 31.9 | 19.2 | 17.5 | 10.2 | 0.18 |
| 931229 | 0100 | 1.78 | 0.142 | 0.142 | 7.04 | 7.04 | 20.0 | 22.0 | 26.4 | 21.2 | 18.3 | 12.9 | 0.15 |
| 931229 | 0400 | 1.52 | 0.132 | 0.142 | 7.56 | 7.04 | 14.0 | 16.0 | 26.7 | 23.7 | 21.0 | 16.5 | 0.16 |
| 931229 | 0700 | 1.35 | 0.142 | 0.142 | 7.04 | 7.04 | 20.0 | 22.0 | 25.8 | 22.3 | 18.9 | 15.7 | 0.17 |
| 931229 | 1000 | 1.24 | 0.142 | 0.142 | 7.04 | 7.04 | 16.0 | 18.0 | 22.4 | 21.3 | 16.0 | 11.8 | 0.13 |
| 931229 | 1300 | 1.08 | 0.132 | 0.123 | 7.56 | 8.16 | 10.0 | 12.0 | 20.8 | 24.2 | 18.3 | 18.8 | 0.11 |
| 931229 | 1600 | 1.08 | 0.123 | 0.123 | 8.16 | 8.16 | 8.0 | 10.0 | 19.1 | 24.7 | 18.8 | 13.3 | 0.14 |
| 931229 | 1900 | 0.93 | 0.123 | 0.113 | 8.16 | 8.87 | 8.0 | 10.0 | 15.4 | 24.7 | 18.6 | 14.1 | 0.18 |
| 931229 | 2200 | 0.74 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 2.0 | 18.2 | 28.6 | 17.0 | 12.5 | 0.20 |
| 931230 | 0100 | 0.58 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 26.0 | 17.0 | 28.4 | 14.5 | 13.1 | 0.15 |
| 931230 | 0400 | 0.59 | 0.152 | 0.152 | 6.59 | 6.59 | 22.0 | 40.0 | 26.7 | 27.7 | 12.6 | 12.3 | 0.18 |
| 931230 | 0700 | 0.58 | 0.191 | 0.162 | 5.24 | 6.19 | 40.0 | 40.0 | 34.8 | 21.1 | 12.2 | 13.2 | 0.19 |
| 931230 | 1000 | 0.76 | 0.171 | 0.171 | 5.83 | 5.83 | 38.0 | 46.0 | 38.9 | 17.8 | 10.3 | 8.9 | 0.24 |
| 931230 | 1300 | 1.01 | 0.171 | 0.162 | 5.83 | 6.19 | 40.0 | 42.0 | 39.1 | 20.1 | 11.2 | 10.2 | 0.19 |
| 931230 | 1600 | 1.20 | 0.152 | 0.152 | 6.59 | 6.59 | 28.0 | 36.0 | 36.2 | 20.3 | 13.8 | 12.4 | 0.16 |
| 931230 | 1900 | 1.08 | 0.162 | 0.162 | 6.19 | 6.19 | 34.0 | 34.0 | 33.4 | 18.4 | 13.8 | 10.9 | 0.17 |
| 931230 | 2200 | 0.95 | 0.142 | 0.152 | 7.04 | 6.59 | 22.0 | 24.0 | 31.2 | 17.8 | 13.8 | 11.2 | 0.14 |
| 931231 | 0100 | 0.76 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 30.0 | 29.3 | 20.4 | 14.5 | 8.8 | 0.11 |
| 931231 | 0400 | 0.73 | 0.171 | 0.171 | 5.83 | 5.83 | 30.0 | 28.0 | 28.7 | 22.8 | 17.2 | 8.1 | 0.14 |
| 931231 | 0700 | 0.64 | 0.123 | 0.171 | 8.16 | 5.83 | 14.0 | 14.0 | 26.1 | 25.6 | 19.0 | 15.0 | 0.18 |
| 931231 | 1000 | 0.59 | 0.132 | 0.132 | 7.56 | 7.56 | 14.0 | 14.0 | 19.8 | 21.7 | 17.1 | 6.9 | 0.20 |
| 931231 | 1300 | 0.48 | 0.142 | 0.142 | 7.04 | 7.04 | 14.0 | 14.0 | 14.1 | 29.2 | 21.8 | 12.2 | 0.15 |
| 931231 | 1600 | 0.42 | 0.152 | 0.152 | 6.59 | 6.59 | 16.0 | 14.0 | 7.8 | 32.2 | 26.6 | 12.7 | 0.20 |
| 931231 | 1900 | 0.41 | 0.171 | 0.113 | 5.83 | 8.87 | 16.0 | 16.0 | 3.7 | 34.0 | 29.5 | 27.6 | 0.28 |
| 931231 | 2200 | 0.42 | 0.113 | 0.093 | 8.87 | 10.72 | -14.0 | -12.0 | -5.3 | 28.2 | 27.4 | 30.6 | 0.31 |

*(Sheet 14 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940101 | 0100 | 0.44 | 0.093 | 0.093 | 10.72 | 10.72 | 2.0 | -10.0 | -3.4 | 23.4 | 24.0 | 23.3 | 0.34 |
| 940101 | 0400 | 0.46 | 0.093 | 0.093 | 10.72 | 10.72 | -6.0 | -10.0 | -8.8 | 22.4 | 23.0 | 22.4 | 0.33 |
| 940101 | 0700 | 0.47 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -6.0 | -6.7 | 23.3 | 23.6 | 21.4 | 0.41 |
| 940101 | 1000 | 0.44 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | -6.0 | -9.0 | 23.9 | 24.0 | 21.0 | 0.35 |
| 940101 | 1300 | 0.43 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | -10.0 | -11.1 | 25.7 | 26.0 | 27.2 | 0.37 |
| 940101 | 1600 | 0.41 | 0.064 | 0.103 | 15.63 | 9.71 | -10.0 | -10.0 | -15.3 | 26.0 | 25.7 | 26.8 | 0.31 |
| 940101 | 1900 | 0.41 | 0.103 | 0.103 | 9.71 | 9.71 | -22.0 | -20.0 | -18.3 | 29.4 | 25.7 | 28.7 | 0.35 |
| 940101 | 2200 | 0.47 | 0.103 | 0.103 | 9.71 | 9.71 | -16.0 | -30.0 | -31.1 | 28.5 | 22.6 | 22.2 | 0.25 |
| 940102 | 0100 | 0.74 | 0.152 | 0.142 | 6.59 | 7.04 | -46.0 | -42.0 | -39.3 | 24.3 | 19.3 | 16.0 | 0.17 |
| 940102 | 0400 | 0.74 | 0.142 | 0.142 | 7.04 | 7.04 | -42.0 | -40.0 | -38.4 | 25.8 | 24.1 | 20.9 | 0.15 |
| 940102 | 0700 | 0.80 | 0.132 | 0.132 | 7.56 | 7.56 | -42.0 | -42.0 | -34.1 | 26.0 | 22.9 | 23.1 | 0.18 |
| 940102 | 1000 | 0.87 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -42.0 | -16.2 | 33.7 | 24.2 | 17.5 | 0.22 |
| 940102 | 1300 | 0.77 | 0.123 | 0.113 | 8.16 | 8.87 | -42.0 | -16.0 | 2.1 | 76.8 | 26.3 | 20.0 | 0.20 |
| 940102 | 1600 | 0.82 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -16.0 | 11.2 | 57.6 | 25.3 | 22.5 | 0.22 |
| 940102 | 1900 | 1.11 | 0.162 | 0.162 | 6.19 | 6.19 | 20.0 | 18.0 | 15.5 | 35.8 | 24.2 | 14.1 | 0.14 |
| 940102 | 2200 | 1.13 | 0.162 | 0.152 | 6.19 | 6.59 | 18.0 | 18.0 | 8.0 | 36.5 | 25.3 | 21.8 | 0.11 |
| 940103 | 0100 | 1.06 | 0.162 | 0.113 | 6.19 | 8.87 | 22.0 | 22.0 | 9.1 | 38.0 | 24.6 | 22.3 | 0.11 |
| 940103 | 0400 | 1.15 | 0.123 | 0.230 | 8.16 | 4.35 | -38.0 | 22.0 | 11.5 | 41.6 | 24.9 | 15.7 | 0.10 |
| 940103 | 0700 | 1.32 | 0.142 | 0.201 | 7.04 | 4.98 | -40.0 | 38.0 | 15.2 | 49.4 | 25.9 | 24.3 | 0.11 |
| 940103 | 1000 | 1.28 | 0.201 | 0.201 | 4.98 | 4.98 | 42.0 | 42.0 | 11.3 | 53.4 | 33.8 | 37.9 | 0.12 |
| 940103 | 1300 | 1.57 | 0.171 | 0.162 | 5.83 | 6.19 | 0.0 | 0.0 | 18.0 | 47.5 | 27.0 | 18.8 | 0.13 |
| 940103 | 1600 | 2.33 | 0.171 | 0.132 | 5.83 | 7.56 | 42.0 | 42.0 | 25.2 | 40.0 | 23.2 | 22.4 | 0.17 |
| 940103 | 1900 | 2.88 | 0.132 | 0.132 | 7.56 | 7.56 | 10.0 | 10.0 | 18.3 | 28.0 | 23.2 | 18.3 | 0.15 |
| 940103 | 2200 | 3.04 | 0.103 | 0.103 | 9.71 | 9.71 | 10.0 | 6.0 | 18.5 | 24.1 | 24.1 | 13.5 | 0.16 |
| 940104 | 0100 | 2.33 | 0.103 | 0.113 | 9.71 | 8.87 | 8.0 | 16.0 | 19.0 | 27.7 | 27.1 | 25.2 | 0.16 |
| 940104 | 0400 | 1.74 | 0.103 | 0.103 | 9.71 | 9.71 | 14.0 | 12.0 | 16.0 | 27.3 | 29.4 | 17.0 | 0.15 |
| 940104 | 0700 | 1.50 | 0.103 | 0.103 | 9.71 | 9.71 | 12.0 | 12.0 | -15.4 | 52.3 | 45.0 | 32.5 | 0.18 |
| 940104 | 1000 | 1.23 | 0.123 | 0.093 | 8.16 | 10.72 | -44.0 | -44.0 | -22.8 | 54.3 | 34.4 | 31.1 | 0.22 |
| 940104 | 1300 | 0.91 | 0.093 | 0.093 | 10.72 | 10.72 | 12.0 | -44.0 | -18.9 | 51.3 | 32.0 | 40.8 | 0.25 |
| 940104 | 1600 | 0.72 | 0.093 | 0.093 | 10.72 | 10.72 | 16.0 | -42.0 | -28.3 | 45.1 | 30.2 | 38.0 | 0.24 |
| 940104 | 1900 | 0.69 | 0.113 | 0.093 | 8.87 | 10.72 | -38.0 | -40.0 | -32.3 | 39.1 | 28.3 | 36.0 | 0.22 |
| 940104 | 2200 | 0.66 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | -40.0 | -22.8 | 42.0 | 36.3 | 38.9 | 0.27 |
| 940105 | 0100 | 0.61 | 0.093 | 0.093 | 10.72 | 10.72 | -2.0 | -40.0 | -11.6 | 45.3 | 37.7 | 32.2 | 0.30 |
| 940105 | 0400 | 0.68 | 0.220 | 0.103 | 4.54 | 9.71 | 52.0 | 52.0 | 19.5 | 62.5 | 25.8 | 36.7 | 0.17 |
| 940105 | 0700 | 0.66 | 0.201 | 0.103 | 4.98 | 9.71 | 50.0 | 50.0 | 16.8 | 60.6 | 28.0 | 43.1 | 0.17 |
| 940105 | 1000 | 0.69 | 0.181 | 0.181 | 5.52 | 5.52 | 42.0 | 42.0 | 25.4 | 47.1 | 25.6 | 10.9 | 0.18 |
| 940105 | 1300 | 0.55 | 0.171 | 0.093 | 5.83 | 10.72 | 36.0 | 36.0 | 19.1 | 51.4 | 27.4 | 35.8 | 0.25 |
| 940105 | 1600 | 0.48 | 0.162 | 0.093 | 6.19 | 10.72 | 28.0 | 12.0 | 21.8 | 44.4 | 26.3 | 33.4 | 0.26 |
| 940105 | 1900 | 0.48 | 0.181 | 0.093 | 5.52 | 10.72 | 26.0 | 10.0 | 16.8 | 42.2 | 25.3 | 24.7 | 0.21 |
| 940105 | 2200 | 0.45 | 0.142 | 0.113 | 7.04 | 8.87 | 10.0 | 10.0 | 15.4 | 39.1 | 25.7 | 36.8 | 0.27 |
| 940106 | 0100 | 0.43 | 0.132 | 0.103 | 7.56 | 9.71 | 10.0 | 10.0 | 7.5 | 42.2 | 30.6 | 33.8 | 0.25 |
| 940106 | 0400 | 0.43 | 0.113 | 0.103 | 8.87 | 9.71 | -36.0 | 10.0 | 1.3 | 37.2 | 29.8 | 24.9 | 0.27 |
| 940106 | 0700 | 0.42 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -8.0 | 2.2 | 34.5 | 31.9 | 24.6 | 0.23 |
| 940106 | 1000 | 0.46 | 0.113 | 0.103 | 8.87 | 9.71 | -6.0 | -10.0 | 0.5 | 35.5 | 31.4 | 25.4 | 0.28 |
| 940106 | 1300 | 0.48 | 0.113 | 0.103 | 8.87 | 9.71 | -34.0 | -10.0 | 1.5 | 39.4 | 29.4 | 25.5 | 0.21 |
| 940106 | 1600 | 0.47 | 0.103 | 0.103 | 9.71 | 9.71 | -20.0 | -10.0 | 5.1 | 38.9 | 29.6 | 21.5 | 0.23 |
| 940106 | 1900 | 0.47 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -14.0 | -28.8 | 41.3 | 43.4 | 22.9 | 0.18 |
| 940106 | 2200 | 0.49 | 0.113 | 0.113 | 8.87 | 8.87 | -34.0 | -38.0 | -34.6 | 35.6 | 29.1 | 19.7 | 0.20 |
| 940107 | 0100 | 0.44 | 0.152 | 0.103 | 6.59 | 9.71 | -42.0 | -40.0 | -35.7 | 30.4 | 20.7 | 21.5 | 0.24 |
| 940107 | 0400 | 0.43 | 0.152 | 0.103 | 6.59 | 9.71 | -40.0 | -40.0 | -33.6 | 28.2 | 19.2 | 22.1 | 0.24 |
| 940107 | 0700 | 0.41 | 0.103 | 0.103 | 9.71 | 9.71 | -28.0 | -38.0 | -35.2 | 24.9 | 17.1 | 16.7 | 0.22 |
| 940107 | 1000 | 0.43 | 0.142 | 0.113 | 7.04 | 8.87 | -40.0 | -38.0 | -34.0 | 22.0 | 17.1 | 16.6 | 0.25 |
| 940107 | 1300 | 0.45 | 0.142 | 0.113 | 7.04 | 8.87 | -40.0 | -40.0 | -38.1 | 22.9 | 17.1 | 17.0 | 0.26 |
| 940107 | 1600 | 0.49 | 0.103 | 0.103 | 9.71 | 9.71 | -32.0 | -40.0 | -42.1 | 22.6 | 15.3 | 14.6 | 0.22 |
| 940107 | 1900 | 0.50 | 0.132 | 0.103 | 7.56 | 9.71 | -38.0 | -40.0 | -43.2 | 26.2 | 14.5 | 16.7 | 0.19 |
| 940107 | 2200 | 0.56 | 0.113 | 0.113 | 8.87 | 8.87 | -28.0 | -40.0 | -38.0 | 23.6 | 15.3 | 13.7 | 0.21 |
| 940108 | 0100 | 0.57 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -42.0 | -43.7 | 23.8 | 13.8 | 11.6 | 0.25 |
| 940108 | 0400 | 0.54 | 0.132 | 0.113 | 7.56 | 8.87 | -42.0 | -42.0 | -42.5 | 20.2 | 14.4 | 13.6 | 0.24 |

*(Sheet 15 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940108 | 0700 | 0.51 | 0.132 | 0.113 | 7.56 | 8.87 | -42.0 | -40.0 | -38.9 | 19.7 | 17.5 | 15.1 | 0.26 |
| 940108 | 1000 | 0.54 | 0.132 | 0.113 | 7.56 | 8.87 | -42.0 | -42.0 | -12.2 | 69.8 | 20.7 | 15.1 | 0.24 |
| 940108 | 1300 | 0.82 | 0.220 | 0.240 | 4.54 | 4.17 | 42.0 | 42.0 | 20.8 | 69.3 | 29.7 | 13.9 | 0.15 |
| 940108 | 1600 | 0.72 | 0.123 | 0.113 | 8.16 | 8.87 | -40.0 | 44.0 | 17.8 | 72.5 | 27.0 | 15.0 | 0.18 |
| 940108 | 1900 | 0.67 | 0.308 | 0.113 | 3.25 | 8.87 | 56.0 | 44.0 | 19.8 | 53.6 | 23.8 | 23.0 | 0.22 |
| 940108 | 2200 | 1.14 | 0.201 | 0.201 | 4.98 | 4.98 | 36.0 | 38.0 | 36.5 | 20.2 | 16.3 | 8.3 | 0.21 |
| 940109 | 0100 | 1.47 | 0.162 | 0.171 | 6.19 | 5.83 | 24.0 | 26.0 | 35.9 | 24.7 | 19.1 | 14.5 | 0.23 |
| 940109 | 0400 | 1.67 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 22.0 | 35.1 | 25.0 | 17.3 | 12.1 | 0.23 |
| 940109 | 0700 | 1.52 | 0.142 | 0.142 | 7.04 | 7.04 | 22.0 | 24.0 | 34.0 | 23.9 | 17.1 | 10.8 | 0.21 |
| 940109 | 1000 | 1.27 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 24.0 | 33.9 | 23.3 | 17.7 | 11.1 | 0.16 |
| 940109 | 1300 | 1.10 | 0.152 | 0.162 | 6.59 | 6.19 | 24.0 | 26.0 | 33.0 | 23.2 | 18.4 | 14.0 | 0.17 |
| 940109 | 1600 | 0.92 | 0.162 | 0.162 | 6.19 | 6.19 | 26.0 | 28.0 | 31.3 | 21.9 | 18.2 | 9.8 | 0.17 |
| 940109 | 1900 | 0.82 | 0.171 | 0.171 | 5.83 | 5.83 | 28.0 | 30.0 | 28.6 | 23.5 | 18.0 | 11.4 | 0.17 |
| 940109 | 2200 | 0.87 | 0.171 | 0.171 | 5.83 | 5.83 | 26.0 | 28.0 | 31.8 | 25.2 | 17.3 | 7.3 | 0.17 |
| 940110 | 0100 | 1.25 | 0.191 | 0.191 | 5.24 | 5.24 | 36.0 | 32.0 | 37.6 | 25.2 | 18.6 | 12.3 | 0.18 |
| 940110 | 0400 | 1.76 | 0.162 | 0.152 | 6.19 | 6.59 | 28.0 | 28.0 | 35.9 | 24.2 | 19.8 | 15.1 | 0.20 |
| 940110 | 0700 | 1.73 | 0.142 | 0.142 | 7.04 | 7.04 | 24.0 | 24.0 | 35.8 | 21.8 | 19.1 | 9.3 | 0.18 |
| 940110 | 1000 | 1.43 | 0.142 | 0.152 | 7.04 | 6.59 | 22.0 | 24.0 | 32.7 | 22.8 | 19.3 | 13.1 | 0.16 |
| 940110 | 1300 | 1.17 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 26.0 | 28.4 | 26.0 | 21.7 | 12.7 | 0.14 |
| 940110 | 1600 | 0.99 | 0.162 | 0.162 | 6.19 | 6.19 | 24.0 | 30.0 | 28.5 | 29.3 | 23.9 | 12.5 | 0.15 |
| 940110 | 1900 | 0.89 | 0.123 | 0.123 | 8.16 | 8.16 | 6.0 | 28.0 | 22.2 | 29.5 | 24.7 | 12.7 | 0.16 |
| 940110 | 2200 | 0.84 | 0.123 | 0.113 | 8.16 | 8.87 | 10.0 | 12.0 | 16.9 | 31.9 | 28.1 | 24.7 | 0.13 |
| 940111 | 0100 | 0.86 | 0.142 | 0.142 | 7.04 | 7.04 | 14.0 | 8.0 | 14.0 | 32.8 | 30.3 | 18.1 | 0.11 |
| 940111 | 0400 | 0.79 | 0.152 | 0.152 | 6.59 | 6.59 | 10.0 | 8.0 | 8.8 | 31.1 | 31.3 | 16.6 | 0.15 |
| 940111 | 0700 | 0.71 | 0.142 | 0.162 | 7.04 | 6.19 | 12.0 | 12.0 | 11.8 | 36.0 | 33.1 | 24.0 | 0.17 |
| 940111 | 1000 | 0.66 | 0.132 | 0.132 | 7.56 | 7.56 | 12.0 | 10.0 | 9.4 | 36.7 | 37.0 | 19.8 | 0.17 |
| 940111 | 1300 | 0.73 | 0.142 | 0.142 | 7.04 | 7.04 | 10.0 | -8.0 | 6.5 | 38.6 | 36.7 | 20.8 | 0.15 |
| 940111 | 1600 | 0.72 | 0.113 | 0.113 | 8.87 | 8.87 | -6.0 | -8.0 | 2.7 | 39.9 | 37.9 | 21.1 | 0.18 |
| 940111 | 1900 | 0.68 | 0.123 | 0.103 | 8.16 | 9.71 | 0.0 | -6.0 | -1.1 | 39.6 | 39.6 | 27.2 | 0.19 |
| 940111 | 2200 | 0.61 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -4.0 | -7.2 | 34.7 | 36.9 | 22.8 | 0.26 |
| 940112 | 0100 | 0.62 | 0.064 | 0.103 | 15.63 | 9.71 | -12.0 | -12.0 | -17.4 | 32.7 | 31.8 | 26.0 | 0.23 |
| 940112 | 0400 | 0.66 | 0.064 | 0.103 | 15.63 | 9.71 | -10.0 | -12.0 | -23.6 | 35.3 | 31.8 | 26.6 | 0.22 |
| 940112 | 0700 | 0.69 | 0.064 | 0.103 | 15.63 | 9.71 | -12.0 | -12.0 | -35.6 | 38.3 | 32.3 | 25.8 | 0.21 |
| 940112 | 1000 | 0.69 | 0.162 | 0.103 | 6.19 | 9.71 | -46.0 | -16.0 | -39.1 | 37.0 | 31.6 | 26.0 | 0.24 |
| 940112 | 1300 | 0.91 | 0.142 | 0.152 | 7.04 | 6.59 | -44.0 | -44.0 | -42.1 | 26.9 | 25.4 | 19.2 | 0.17 |
| 940112 | 1600 | 1.23 | 0.123 | 0.123 | 8.16 | 8.16 | -46.0 | -44.0 | -35.6 | 28.9 | 27.5 | 25.6 | 0.17 |
| 940112 | 1900 | 1.15 | 0.113 | 0.103 | 8.87 | 9.71 | -28.0 | -28.0 | -16.2 | 56.6 | 26.2 | 17.6 | 0.21 |
| 940112 | 2200 | 1.08 | 0.103 | 0.103 | 9.71 | 9.71 | -30.0 | -40.0 | -15.3 | 47.0 | 21.7 | 17.5 | 0.15 |
| 940113 | 0100 | 1.06 | 0.103 | 0.103 | 9.71 | 9.71 | -26.0 | -26.0 | -13.0 | 38.7 | 22.0 | 16.5 | 0.13 |
| 940113 | 0400 | 0.98 | 0.113 | 0.113 | 8.87 | 8.87 | -44.0 | -42.0 | -13.2 | 58.3 | 22.6 | 20.3 | 0.15 |
| 940113 | 0700 | 0.94 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -28.0 | -4.1 | 65.4 | 23.5 | 20.9 | 0.19 |
| 940113 | 1000 | 0.99 | 0.113 | 0.113 | 8.87 | 8.87 | -20.0 | -20.0 | -2.6 | 57.6 | 23.1 | 22.5 | 0.18 |
| 940113 | 1300 | 0.95 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -18.0 | 0.2 | 52.3 | 21.3 | 21.3 | 0.16 |
| 940113 | 1600 | 0.92 | 0.113 | 0.113 | 8.87 | 8.87 | -26.0 | -24.0 | -3.1 | 52.4 | 25.6 | 17.2 | 0.16 |
| 940113 | 1900 | 0.91 | 0.123 | 0.123 | 8.16 | 8.16 | -40.0 | 28.0 | -0.9 | 53.1 | 29.0 | 20.8 | 0.22 |
| 940113 | 2200 | 0.85 | 0.113 | 0.113 | 8.87 | 8.87 | -20.0 | 10.0 | 9.9 | 48.0 | 29.0 | 22.7 | 0.21 |
| 940114 | 0100 | 0.85 | 0.113 | 0.123 | 8.87 | 8.16 | -26.0 | 6.0 | 8.0 | 42.6 | 26.8 | 26.4 | 0.19 |
| 940114 | 0400 | 0.95 | 0.123 | 0.123 | 8.16 | 8.16 | -32.0 | 48.0 | 17.6 | 47.6 | 25.3 | 15.9 | 0.21 |
| 940114 | 0700 | 0.96 | 0.250 | 0.230 | 4.01 | 4.35 | 46.0 | 44.0 | 18.0 | 42.5 | 25.1 | 23.1 | 0.23 |
| 940114 | 1000 | 0.80 | 0.210 | 0.123 | 4.75 | 8.16 | 28.0 | 12.0 | 13.4 | 41.4 | 24.8 | 23.6 | 0.24 |
| 940114 | 1300 | 0.67 | 0.113 | 0.054 | 8.87 | 18.45 | -36.0 | 8.0 | 3.0 | 36.7 | 26.0 | 30.0 | 0.27 |
| 940114 | 1600 | 0.61 | 0.054 | 0.054 | 18.45 | 18.45 | 8.0 | 6.0 | 0.4 | 31.7 | 27.1 | 27.3 | 0.36 |
| 940114 | 1900 | 0.57 | 0.054 | 0.054 | 18.45 | 18.45 | 2.0 | -10.0 | -5.5 | 30.4 | 27.3 | 26.4 | 0.43 |
| 940114 | 2200 | 0.65 | 0.054 | 0.054 | 18.45 | 18.45 | 0.0 | 56.0 | 17.7 | 54.7 | 22.5 | 20.7 | 9.99 |
| 940115 | 0100 | 1.44 | 0.171 | 0.171 | 5.83 | 5.83 | 36.0 | 42.0 | 36.7 | 16.7 | 12.8 | 8.0 | 0.24 |
| 940115 | 0400 | 1.19 | 0.162 | 0.152 | 6.19 | 6.59 | 36.0 | 36.0 | 30.1 | 20.5 | 16.3 | 10.5 | 0.21 |
| 940115 | 0700 | 1.19 | 0.142 | 0.162 | 7.04 | 6.19 | 26.0 | 32.0 | 27.7 | 24.4 | 18.0 | 11.5 | 0.17 |
| 940115 | 1000 | 1.03 | 0.142 | 0.142 | 7.04 | 7.04 | 22.0 | 26.0 | 25.7 | 25.6 | 18.2 | 15.0 | 0.19 |

*(Sheet 16 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940115 | 1300 | 0.78 | 0.152 | 0.054 | 6.59 | 18.45 | 26.0 | 26.0 | 24.1 | 34.9 | 16.7 | 20.4 | 0.20 |
| 940115 | 1600 | 0.78 | 0.162 | 0.054 | 6.19 | 18.45 | 28.0 | 48.0 | 29.0 | 37.3 | 14.2 | 24.2 | 0.23 |
| 940115 | 1900 | 0.85 | 0.191 | 0.054 | 5.24 | 18.45 | 40.0 | 56.0 | 38.6 | 28.4 | 13.3 | 20.2 | 0.28 |
| 940115 | 2200 | 0.95 | 0.240 | 0.298 | 4.17 | 3.35 | 52.0 | 52.0 | 44.1 | 19.3 | 11.4 | 11.1 | 0.41 |
| 940116 | 0100 | 1.17 | 0.162 | 0.162 | 6.19 | 6.19 | 40.0 | 40.0 | 39.4 | 17.8 | 11.7 | 8.6 | 0.23 |
| 940116 | 0400 | 1.18 | 0.162 | 0.162 | 6.19 | 6.19 | 34.0 | 36.0 | 37.9 | 19.8 | 12.1 | 8.0 | 0.21 |
| 940116 | 0700 | 1.28 | 0.162 | 0.162 | 6.19 | 6.19 | 44.0 | 44.0 | 40.7 | 22.2 | 13.6 | 9.8 | 0.23 |
| 940116 | 1000 | 1.20 | 0.162 | 0.152 | 6.19 | 6.59 | 42.0 | 42.0 | 37.8 | 22.3 | 14.8 | 11.2 | 0.22 |
| 940116 | 1300 | 1.03 | 0.152 | 0.152 | 6.59 | 6.59 | 28.0 | 30.0 | 35.2 | 21.9 | 15.4 | 10.0 | 0.20 |
| 940116 | 1600 | 0.83 | 0.142 | 0.162 | 7.04 | 6.19 | 22.0 | 30.0 | 32.6 | 26.2 | 18.5 | 12.2 | 0.16 |
| 940116 | 1900 | 0.72 | 0.181 | 0.181 | 5.52 | 5.52 | 38.0 | 38.0 | 32.0 | 32.5 | 22.2 | 14.8 | 0.16 |
| 940116 | 2200 | 0.66 | 0.191 | 0.191 | 5.24 | 5.24 | 34.0 | 12.0 | 26.3 | 37.3 | 25.4 | 24.1 | 0.17 |
| 940117 | 0100 | 0.60 | 0.142 | 0.142 | 7.04 | 7.04 | 10.0 | 12.0 | 23.9 | 36.2 | 28.1 | 16.0 | 0.18 |
| 940117 | 0400 | 0.55 | 0.123 | 0.123 | 8.16 | 8.16 | 8.0 | 10.0 | 14.4 | 35.5 | 28.0 | 22.7 | 0.17 |
| 940117 | 0700 | 0.64 | 0.308 | 0.308 | 3.25 | 3.25 | -36.0 | -14.0 | -4.4 | 40.0 | 34.5 | 35.0 | 0.16 |
| 940117 | 1000 | 0.53 | 0.152 | 0.152 | 6.59 | 6.59 | 14.0 | -10.0 | 1.2 | 32.4 | 30.6 | 31.2 | 0.18 |
| 940117 | 1300 | 0.85 | 0.162 | 0.162 | 6.19 | 6.19 | -44.0 | -44.0 | -39.7 | 26.5 | 23.2 | 16.6 | 0.12 |
| 940117 | 1600 | 0.96 | 0.142 | 0.142 | 7.04 | 7.04 | -38.0 | -38.0 | -41.3 | 23.8 | 20.0 | 18.8 | 0.17 |
| 940117 | 1900 | 1.20 | 0.132 | 0.123 | 7.56 | 8.16 | -40.0 | -52.0 | -44.1 | 24.8 | 15.6 | 19.3 | 0.29 |
| 940117 | 2200 | 1.13 | 0.123 | 0.123 | 8.16 | 8.16 | -40.0 | -40.0 | -41.7 | 23.9 | 19.3 | 20.3 | 0.20 |
| 940118 | 0100 | 1.11 | 0.132 | 0.113 | 7.56 | 8.87 | -40.0 | -40.0 | -36.6 | 25.8 | 23.1 | 24.4 | 0.16 |
| 940118 | 0400 | 1.14 | 0.103 | 0.103 | 9.71 | 9.71 | -32.0 | -40.0 | -4.1 | 75.3 | 22.6 | 22.6 | 0.17 |
| 940118 | 0700 | 1.13 | 0.103 | 0.103 | 9.71 | 9.71 | -36.0 | -36.0 | 4.4 | 71.1 | 23.5 | 19.5 | 0.15 |
| 940118 | 1900 | 1.40 | 0.181 | 0.162 | 5.52 | 6.19 | 32.0 | 34.0 | 26.7 | 33.4 | 17.1 | 14.3 | 0.22 |
| 940118 | 2200 | 1.40 | 0.162 | 0.171 | 6.19 | 5.83 | 28.0 | 52.0 | 30.4 | 26.1 | 14.5 | 11.4 | 0.27 |
| 940119 | 0100 | 1.60 | 0.162 | 0.162 | 6.19 | 6.19 | 34.0 | 38.0 | 34.0 | 23.7 | 15.0 | 9.5 | 0.24 |
| 940119 | 0400 | 1.53 | 0.152 | 0.152 | 6.59 | 6.59 | 34.0 | 34.0 | 33.1 | 23.4 | 15.1 | 9.4 | 0.24 |
| 940119 | 0700 | 1.76 | 0.142 | 0.152 | 7.04 | 6.59 | 26.0 | 28.0 | 34.4 | 20.6 | 14.3 | 11.2 | 0.21 |
| 940119 | 1000 | 1.74 | 0.152 | 0.152 | 6.59 | 6.59 | 32.0 | 32.0 | 36.4 | 22.3 | 14.3 | 9.6 | 0.23 |
| 940119 | 1300 | 1.49 | 0.142 | 0.162 | 7.04 | 6.19 | 22.0 | 24.0 | 33.3 | 24.2 | 15.7 | 11.2 | 0.23 |
| 940119 | 1600 | 1.14 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 32.0 | 30.0 | 26.5 | 18.0 | 11.4 | 0.17 |
| 940119 | 1900 | 0.93 | 0.162 | 0.162 | 6.19 | 6.19 | 30.0 | 32.0 | 25.3 | 35.4 | 21.1 | 12.3 | 0.13 |
| 940119 | 2200 | 0.83 | 0.152 | 0.113 | 6.59 | 8.87 | 18.0 | 14.0 | 21.4 | 37.4 | 23.6 | 28.1 | 0.14 |
| 940120 | 0100 | 0.74 | 0.142 | 0.142 | 7.04 | 7.04 | 24.0 | 10.0 | 17.6 | 37.9 | 24.6 | 18.7 | 0.18 |
| 940120 | 0400 | 0.65 | 0.162 | 0.093 | 6.19 | 10.72 | 10.0 | 10.0 | 11.4 | 36.2 | 23.7 | 23.7 | 0.21 |
| 940120 | 0700 | 0.69 | 0.318 | 0.103 | 3.15 | 9.71 | 64.0 | 12.0 | 19.7 | 45.2 | 25.5 | 25.3 | 0.23 |
| 940120 | 1000 | 0.68 | 0.103 | 0.093 | 9.71 | 10.72 | -20.0 | 12.0 | 11.3 | 39.7 | 24.6 | 25.7 | 0.16 |
| 940120 | 1300 | 0.76 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | 8.0 | 18.3 | 47.9 | 26.9 | 27.9 | 0.20 |
| 940120 | 1600 | 0.78 | 0.259 | 0.093 | 3.86 | 10.72 | 54.0 | 10.0 | 18.3 | 47.2 | 25.9 | 29.1 | 0.18 |
| 940120 | 1900 | 0.90 | 0.230 | 0.103 | 4.35 | 9.71 | 26.0 | 24.0 | 21.6 | 44.0 | 23.0 | 26.2 | 0.17 |
| 940120 | 2200 | 0.95 | 0.210 | 0.220 | 4.75 | 4.54 | 20.0 | 22.0 | 21.2 | 40.3 | 23.7 | 23.3 | 0.19 |
| 940121 | 0100 | 1.09 | 0.201 | 0.220 | 4.98 | 4.54 | 22.0 | 54.0 | 27.0 | 38.8 | 20.7 | 19.5 | 0.22 |
| 940121 | 0400 | 1.21 | 0.191 | 0.191 | 5.24 | 5.24 | 34.0 | 40.0 | 31.6 | 29.2 | 17.0 | 13.5 | 0.24 |
| 940121 | 0700 | 1.23 | 0.171 | 0.181 | 5.83 | 5.52 | 24.0 | 34.0 | 29.9 | 29.3 | 18.3 | 17.9 | 0.19 |
| 940121 | 1000 | 1.28 | 0.171 | 0.171 | 5.83 | 5.83 | 26.0 | 26.0 | 27.7 | 29.6 | 16.4 | 9.8 | 0.20 |
| 940121 | 1300 | 1.15 | 0.171 | 0.171 | 5.83 | 5.83 | 26.0 | 28.0 | 25.0 | 32.1 | 17.4 | 10.6 | 0.21 |
| 940121 | 1600 | 1.01 | 0.171 | 0.171 | 5.83 | 5.83 | 26.0 | 26.0 | 19.8 | 33.8 | 19.5 | 15.5 | 0.16 |
| 940121 | 1900 | 0.91 | 0.171 | 0.093 | 5.83 | 10.72 | 20.0 | 18.0 | 11.3 | 34.1 | 20.2 | 24.7 | 0.14 |
| 940121 | 2200 | 0.84 | 0.171 | 0.093 | 5.83 | 10.72 | 24.0 | 24.0 | 10.4 | 37.2 | 22.9 | 30.3 | 0.16 |
| 940122 | 0100 | 0.74 | 0.093 | 0.093 | 10.72 | 10.72 | -8.0 | -8.0 | 4.6 | 33.7 | 21.4 | 22.6 | 0.18 |
| 940122 | 0400 | 0.60 | 0.093 | 0.093 | 10.72 | 10.72 | -10.0 | -6.0 | 1.5 | 28.4 | 23.5 | 25.7 | 0.24 |
| 940122 | 0700 | 0.50 | 0.093 | 0.093 | 10.72 | 10.72 | -10.0 | -8.0 | -7.5 | 28.3 | 25.8 | 26.8 | 0.26 |
| 940122 | 1000 | 0.44 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -10.0 | -8.5 | 26.8 | 26.1 | 27.3 | 0.27 |
| 940122 | 1300 | 0.40 | 0.093 | 0.093 | 10.72 | 10.72 | -10.0 | -8.0 | -8.9 | 28.6 | 29.2 | 29.4 | 0.27 |
| 940122 | 1600 | 0.37 | 0.093 | 0.103 | 10.72 | 9.71 | -22.0 | -20.0 | -13.4 | 31.4 | 32.3 | 29.0 | 0.25 |
| 940122 | 1900 | 0.36 | 0.093 | 0.093 | 10.72 | 10.72 | -10.0 | -12.0 | -14.9 | 29.1 | 31.0 | 25.3 | 0.29 |
| 940122 | 2200 | 0.35 | 0.093 | 0.103 | 10.72 | 9.71 | -26.0 | -16.0 | -23.9 | 33.8 | 29.0 | 29.1 | 0.26 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940123 | 0100 | 0.37 | 0.181 | 0.103 | 5.52 | 9.71 | -46.0 | -46.0 | -34.5 | 36.9 | 24.4 | 30.3 | 0.22 |
| 940123 | 0400 | 0.36 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | -36.0 | -21.9 | 41.5 | 29.6 | 23.9 | 0.25 |
| 940123 | 0700 | 0.40 | 0.142 | 0.093 | 7.04 | 10.72 | 12.0 | 10.0 | -5.2 | 41.1 | 29.3 | 24.1 | 0.21 |
| 940123 | 1000 | 0.43 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | 10.0 | 13.2 | 42.5 | 27.9 | 27.8 | 0.18 |
| 940123 | 1300 | 0.49 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | 10.0 | 11.3 | 47.4 | 31.8 | 25.8 | 0.20 |
| 940123 | 1600 | 0.45 | 0.113 | 0.113 | 8.87 | 8.87 | -4.0 | 26.0 | 12.3 | 48.4 | 34.6 | 26.8 | 0.20 |
| 940123 | 1900 | 0.40 | 0.103 | 0.093 | 9.71 | 10.72 | -34.0 | -32.0 | 1.6 | 45.7 | 34.5 | 29.0 | 0.23 |
| 940123 | 2200 | 0.32 | 0.103 | 0.093 | 9.71 | 10.72 | -32.0 | -30.0 | -7.9 | 38.3 | 39.4 | 28.2 | 0.25 |
| 940124 | 0100 | 0.26 | 0.103 | 0.103 | 9.71 | 9.71 | -32.0 | -32.0 | -23.3 | 34.0 | 35.5 | 21.6 | 0.33 |
| 940124 | 0400 | 0.23 | 0.103 | 0.103 | 9.71 | 9.71 | -32.0 | -34.0 | -27.9 | 31.2 | 33.8 | 22.7 | 0.32 |
| 940124 | 0700 | 0.24 | 0.103 | 0.093 | 9.71 | 10.72 | -34.0 | -32.0 | -31.1 | 30.1 | 26.9 | 29.1 | 0.30 |
| 940124 | 1300 | 0.27 | 0.093 | 0.093 | 10.72 | 10.72 | -30.0 | -30.0 | -31.5 | 26.9 | 25.9 | 20.8 | 0.32 |
| 940124 | 1600 | 0.29 | 0.083 | 0.083 | 11.98 | 11.98 | -26.0 | -32.0 | -31.7 | 27.1 | 26.4 | 23.4 | 0.35 |
| 940124 | 1900 | 0.30 | 0.083 | 0.083 | 11.98 | 11.98 | -24.0 | -30.0 | -29.9 | 27.2 | 27.7 | 26.7 | 0.34 |
| 940124 | 2200 | 0.32 | 0.093 | 0.083 | 10.72 | 11.98 | -24.0 | -26.0 | -27.7 | 25.5 | 26.0 | 18.7 | 0.32 |
| 940125 | 0100 | 0.34 | 0.093 | 0.093 | 10.72 | 10.72 | -32.0 | -32.0 | -30.5 | 24.4 | 26.4 | 21.8 | 0.32 |
| 940125 | 0400 | 0.34 | 0.093 | 0.083 | 10.72 | 11.98 | -32.0 | -32.0 | -34.2 | 29.4 | 33.0 | 24.5 | 0.34 |
| 940125 | 0700 | 0.35 | 0.083 | 0.083 | 11.98 | 11.98 | -32.0 | -32.0 | -31.7 | 27.8 | 30.8 | 21.5 | 0.35 |
| 940125 | 1000 | 0.34 | 0.093 | 0.093 | 10.72 | 10.72 | -36.0 | -30.0 | -28.5 | 27.4 | 29.3 | 23.0 | 0.29 |
| 940125 | 1300 | 0.36 | 0.093 | 0.093 | 10.72 | 10.72 | -30.0 | -32.0 | -27.6 | 27.9 | 29.2 | 25.0 | 0.28 |
| 940125 | 1600 | 0.40 | 0.318 | 0.093 | 3.15 | 10.72 | 56.0 | 56.0 | -5.1 | 57.5 | 22.9 | 20.5 | 0.34 |
| 940125 | 1900 | 0.40 | 0.093 | 0.093 | 10.72 | 10.72 | -36.0 | -36.0 | -4.5 | 68.1 | 23.6 | 23.5 | 0.34 |
| 940125 | 2200 | 0.56 | 0.201 | 0.093 | 4.98 | 10.72 | 38.0 | 38.0 | 17.3 | 53.5 | 15.8 | 23.5 | 0.23 |
| 940126 | 0100 | 0.57 | 0.191 | 0.093 | 5.24 | 10.72 | 36.0 | 40.0 | 12.6 | 54.2 | 18.8 | 21.3 | 0.22 |
| 940126 | 0400 | 0.55 | 0.181 | 0.093 | 5.52 | 10.72 | 24.0 | 24.0 | 7.4 | 52.3 | 19.9 | 20.6 | 0.27 |
| 940126 | 1000 | 0.44 | 0.093 | 0.093 | 10.72 | 10.72 | -28.0 | -28.0 | -6.4 | 51.3 | 23.1 | 22.2 | 0.33 |
| 940126 | 1300 | 0.60 | 0.308 | 0.093 | 3.25 | 10.72 | 44.0 | 44.0 | 15.8 | 51.6 | 17.6 | 23.2 | 0.30 |
| 940126 | 1600 | 1.50 | 0.220 | 0.181 | 4.54 | 5.52 | 44.0 | 40.0 | 33.9 | 18.7 | 15.5 | 13.2 | 0.23 |
| 940126 | 1900 | 1.82 | 0.142 | 0.123 | 7.04 | 8.16 | 22.0 | 24.0 | 28.8 | 21.4 | 18.8 | 19.9 | 0.17 |
| 940126 | 2200 | 2.12 | 0.103 | 0.103 | 9.71 | 9.71 | 12.0 | 14.0 | 23.8 | 24.7 | 21.6 | 16.3 | 0.15 |
| 940127 | 0100 | 2.32 | 0.093 | 0.093 | 10.72 | 10.72 | 4.0 | 12.0 | 12.2 | 20.5 | 20.7 | 15.0 | 0.12 |
| 940127 | 0400 | 2.68 | 0.093 | 0.093 | 10.72 | 10.72 | 12.0 | 12.0 | 11.7 | 20.8 | 21.7 | 16.2 | 0.14 |
| 940127 | 0700 | 2.77 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | 12.0 | 14.8 | 23.7 | 24.0 | 17.4 | 0.16 |
| 940127 | 1000 | 2.62 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | 10.0 | 8.4 | 23.0 | 23.7 | 20.2 | 0.13 |
| 940127 | 1300 | 2.43 | 0.083 | 0.083 | 11.98 | 11.98 | 0.0 | 4.0 | 6.1 | 22.9 | 24.3 | 17.5 | 0.12 |
| 940127 | 1600 | 2.29 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | 6.0 | 8.0 | 24.6 | 26.5 | 17.7 | 0.12 |
| 940127 | 1900 | 2.15 | 0.083 | 0.083 | 11.98 | 11.98 | 2.0 | 2.0 | 6.5 | 28.5 | 31.5 | 15.2 | 0.13 |
| 940127 | 2200 | 1.99 | 0.083 | 0.083 | 11.98 | 11.98 | 2.0 | 6.0 | 7.6 | 31.7 | 34.2 | 16.4 | 0.12 |
| 940128 | 0100 | 2.05 | 0.093 | 0.123 | 10.72 | 8.16 | 4.0 | 0.0 | -3.7 | 30.6 | 32.6 | 27.2 | 0.14 |
| 940128 | 0400 | 2.04 | 0.093 | 0.123 | 10.72 | 8.16 | 0.0 | 0.0 | -11.2 | 35.5 | 35.0 | 29.4 | 0.15 |
| 940128 | 0700 | 2.14 | 0.123 | 0.113 | 8.16 | 8.87 | -14.0 | -10.0 | -28.0 | 38.0 | 33.4 | 33.5 | 0.21 |
| 940128 | 1000 | 2.28 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -16.0 | -31.2 | 35.8 | 26.4 | 24.9 | 0.25 |
| 940128 | 1300 | 2.27 | 0.103 | 0.103 | 9.71 | 9.71 | -26.0 | -20.0 | -28.8 | 28.1 | 24.9 | 24.9 | 0.19 |
| 940128 | 1600 | 2.00 | 0.103 | 0.103 | 9.71 | 9.71 | -22.0 | -22.0 | -24.9 | 27.8 | 25.4 | 26.4 | 0.14 |
| 940128 | 1900 | 1.72 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -18.0 | -24.0 | 29.3 | 27.1 | 26.8 | 0.15 |
| 940128 | 2200 | 1.35 | 0.103 | 0.103 | 9.71 | 9.71 | -8.0 | -12.0 | -21.6 | 31.2 | 27.7 | 28.1 | 0.16 |
| 940129 | 0100 | 1.25 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -12.0 | -19.3 | 27.0 | 24.9 | 23.1 | 0.11 |
| 940129 | 0400 | 1.20 | 0.113 | 0.113 | 8.87 | 8.87 | -10.0 | -12.0 | -19.4 | 29.0 | 25.4 | 23.4 | 0.14 |
| 940129 | 0700 | 1.14 | 0.113 | 0.113 | 8.87 | 8.87 | -26.0 | -38.0 | -26.6 | 28.2 | 23.8 | 25.2 | 0.19 |
| 940129 | 1000 | 0.94 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -22.0 | -27.2 | 29.9 | 23.4 | 22.0 | 0.20 |
| 940129 | 1300 | 0.86 | 0.103 | 0.103 | 9.71 | 9.71 | -8.0 | -8.0 | -19.1 | 28.7 | 26.1 | 23.6 | 0.12 |
| 940129 | 1600 | 0.87 | 0.113 | 0.113 | 8.87 | 8.87 | -10.0 | -10.0 | -8.4 | 30.1 | 28.8 | 25.0 | 0.17 |
| 940129 | 1900 | 0.92 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -20.0 | -10.5 | 38.6 | 24.5 | 20.6 | 0.16 |
| 940129 | 2200 | 0.85 | 0.123 | 0.113 | 8.16 | 8.87 | -38.0 | 8.0 | -9.1 | 39.4 | 26.2 | 26.3 | 0.16 |
| 940130 | 0100 | 0.90 | 0.113 | 0.113 | 8.87 | 8.87 | -24.0 | 6.0 | -5.5 | 39.1 | 25.7 | 21.1 | 0.12 |
| 940130 | 0400 | 1.43 | 0.191 | 0.201 | 5.24 | 4.98 | 26.0 | 6.0 | 9.0 | 32.8 | 24.9 | 19.2 | 0.11 |
| 940130 | 0700 | 1.78 | 0.162 | 0.162 | 6.19 | 6.19 | 16.0 | 14.0 | 20.5 | 34.2 | 28.1 | 17.4 | 0.15 |
| 940130 | 1000 | 1.85 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 28.0 | 23.3 | 35.6 | 26.5 | 21.5 | 0.15 |

*(Sheet 18 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940130 | 1300 | 1.82 | 0.152 | 0.152 | 6.59 | 6.59 | 16.0 | 16.0 | 21.2 | 35.1 | 24.7 | 13.1 | 0.13 |
| 940130 | 1600 | 1.84 | 0.152 | 0.162 | 6.59 | 6.19 | 18.0 | 16.0 | 21.4 | 37.2 | 24.7 | 21.9 | 0.13 |
| 940130 | 1900 | 2.12 | 0.152 | 0.162 | 6.59 | 6.19 | 24.0 | 28.0 | 27.5 | 31.1 | 23.9 | 19.4 | 0.16 |
| 940130 | 2200 | 2.29 | 0.132 | 0.132 | 7.56 | 7.56 | 22.0 | 20.0 | 27.4 | 26.4 | 23.3 | 15.6 | 0.16 |
| 940131 | 0100 | 2.23 | 0.123 | 0.123 | 8.16 | 8.16 | 10.0 | 10.0 | 25.2 | 29.4 | 22.0 | 15.4 | 0.16 |
| 940131 | 0400 | 2.28 | 0.132 | 0.123 | 7.56 | 8.16 | 12.0 | 14.0 | 21.8 | 31.2 | 22.6 | 22.9 | 0.16 |
| 940131 | 0700 | 2.20 | 0.132 | 0.123 | 7.56 | 8.16 | 10.0 | 10.0 | 20.7 | 34.1 | 22.4 | 22.5 | 0.18 |
| 940131 | 1000 | 1.89 | 0.123 | 0.123 | 8.16 | 8.16 | 10.0 | 12.0 | 20.8 | 33.0 | 21.4 | 19.0 | 0.19 |
| 940131 | 1300 | 1.61 | 0.132 | 0.123 | 7.56 | 8.16 | 12.0 | 14.0 | 15.4 | 28.9 | 21.9 | 21.8 | 0.15 |
| 940131 | 1600 | 1.49 | 0.113 | 0.123 | 8.87 | 8.16 | 8.0 | 10.0 | 14.3 | 26.7 | 21.5 | 21.9 | 0.13 |
| 940131 | 1900 | 1.32 | 0.132 | 0.123 | 7.56 | 8.16 | 10.0 | 10.0 | 13.8 | 31.0 | 23.4 | 23.8 | 0.15 |
| 940131 | 2200 | 1.21 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 10.0 | 13.5 | 31.8 | 23.5 | 21.1 | 0.20 |
| 940201 | 0100 | 1.14 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | 14.0 | 8.0 | 28.3 | 21.6 | 22.0 | 0.16 |
| 940201 | 0400 | 1.10 | 0.113 | 0.103 | 8.87 | 9.71 | 0.0 | 2.0 | 7.4 | 27.1 | 21.9 | 23.8 | 0.12 |
| 940201 | 0700 | 1.11 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -4.0 | 3.9 | 24.9 | 22.2 | 18.8 | 0.18 |
| 940201 | 1300 | 0.89 | 0.113 | 0.103 | 8.87 | 9.71 | -6.0 | -10.0 | -0.4 | 25.1 | 21.9 | 21.4 | 0.20 |
| 940201 | 1600 | 0.82 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | -8.0 | 1.0 | 25.3 | 23.9 | 20.4 | 0.13 |
| 940201 | 1900 | 0.85 | 0.103 | 0.103 | 9.71 | 9.71 | -2.0 | -8.0 | 0.2 | 26.5 | 25.6 | 23.1 | 0.18 |
| 940201 | 2200 | 0.84 | 0.113 | 0.103 | 8.87 | 9.71 | -14.0 | -12.0 | -1.8 | 26.4 | 24.5 | 20.1 | 0.27 |
| 940202 | 0100 | 0.85 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | 6.0 | 10.9 | 41.0 | 23.7 | 20.9 | 0.23 |
| 940202 | 0400 | 1.01 | 0.220 | 0.103 | 4.54 | 9.71 | 44.0 | 46.0 | 25.9 | 46.2 | 21.1 | 20.9 | 0.14 |
| 940202 | 0700 | 1.38 | 0.171 | 0.181 | 5.83 | 5.52 | 16.0 | 16.0 | 19.4 | 31.4 | 22.2 | 17.8 | 0.13 |
| 940202 | 1000 | 1.76 | 0.171 | 0.171 | 5.83 | 5.83 | 18.0 | 18.0 | 29.4 | 29.6 | 25.0 | 15.1 | 0.16 |
| 940202 | 1300 | 1.78 | 0.152 | 0.162 | 6.59 | 6.19 | 22.0 | 22.0 | 26.8 | 27.7 | 22.9 | 19.9 | 0.15 |
| 940202 | 1600 | 1.53 | 0.152 | 0.152 | 6.59 | 6.59 | 18.0 | 14.0 | 24.8 | 28.9 | 21.1 | 17.4 | 0.14 |
| 940202 | 1900 | 1.38 | 0.152 | 0.152 | 6.59 | 6.59 | 14.0 | 10.0 | 19.4 | 26.2 | 21.1 | 15.5 | 0.13 |
| 940202 | 2200 | 1.16 | 0.142 | 0.152 | 7.04 | 6.59 | 10.0 | 12.0 | 18.3 | 24.5 | 22.0 | 14.3 | 0.15 |
| 940203 | 0100 | 0.92 | 0.152 | 0.152 | 6.59 | 6.59 | 12.0 | 12.0 | 18.8 | 23.6 | 20.3 | 9.7 | 0.15 |
| 940203 | 0400 | 0.69 | 0.152 | 0.103 | 6.59 | 9.71 | 12.0 | 12.0 | 12.4 | 24.0 | 20.3 | 25.1 | 0.14 |
| 940203 | 0700 | 0.60 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | 10.0 | 7.5 | 25.4 | 23.0 | 24.3 | 0.15 |
| 940203 | 1000 | 0.59 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | -12.0 | -7.3 | 26.4 | 25.9 | 23.2 | 0.26 |
| 940203 | 1300 | 0.48 | 0.103 | 0.103 | 9.71 | 9.71 | -10.0 | -10.0 | -11.7 | 28.7 | 26.8 | 25.7 | 0.28 |
| 940203 | 1600 | 0.41 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | -12.0 | -16.4 | 29.8 | 23.9 | 22.4 | 0.28 |
| 940203 | 1900 | 0.41 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | -52.0 | -24.2 | 44.7 | 18.5 | 23.8 | 0.20 |
| 940203 | 2200 | 0.38 | 0.269 | 0.103 | 3.72 | 9.71 | -54.0 | -52.0 | -34.9 | 37.4 | 16.2 | 24.7 | 0.23 |
| 940204 | 0100 | 0.31 | 0.113 | 0.103 | 8.87 | 9.71 | -36.0 | -54.0 | -40.0 | 36.1 | 19.5 | 28.4 | 0.27 |
| 940204 | 0400 | 0.28 | 0.103 | 0.103 | 9.71 | 9.71 | -30.0 | -52.0 | -39.4 | 34.9 | 21.9 | 25.5 | 0.28 |
| 940204 | 0700 | 0.26 | 0.103 | 0.103 | 9.71 | 9.71 | -32.0 | -34.0 | -37.5 | 30.5 | 22.9 | 22.1 | 0.27 |
| 940204 | 1000 | 0.30 | 0.103 | 0.103 | 9.71 | 9.71 | -30.0 | -36.0 | -31.7 | 47.3 | 46.2 | 17.3 | 0.25 |
| 940204 | 1300 | 0.38 | 0.210 | 0.103 | 4.75 | 9.71 | 32.0 | 30.0 | 8.0 | 60.1 | 33.8 | 20.4 | 0.21 |
| 940204 | 1600 | 0.35 | 0.103 | 0.103 | 9.71 | 9.71 | -36.0 | -36.0 | 2.0 | 57.7 | 39.1 | 22.5 | 0.23 |
| 940204 | 1900 | 0.30 | 0.103 | 0.103 | 9.71 | 9.71 | -24.0 | -36.0 | -12.5 | 46.3 | 33.0 | 22.0 | 0.22 |
| 940204 | 2200 | 0.28 | 0.103 | 0.103 | 9.71 | 9.71 | -32.0 | -34.0 | -16.3 | 42.3 | 33.6 | 20.7 | 0.27 |
| 940205 | 0100 | 0.25 | 0.103 | 0.103 | 9.71 | 9.71 | -30.0 | -36.0 | -26.9 | 35.1 | 31.9 | 17.4 | 0.24 |
| 940205 | 0400 | 0.23 | 0.113 | 0.113 | 8.87 | 8.87 | -36.0 | -36.0 | -32.2 | 33.3 | 32.3 | 18.1 | 0.25 |
| 940205 | 0700 | 0.25 | 0.113 | 0.113 | 8.87 | 8.87 | -26.0 | -30.0 | -31.8 | 23.5 | 21.2 | 13.4 | 0.25 |
| 940205 | 1000 | 0.27 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -34.0 | -32.8 | 22.1 | 19.3 | 15.3 | 0.26 |
| 940205 | 1300 | 0.31 | 0.113 | 0.113 | 8.87 | 8.87 | -26.0 | -34.0 | -30.9 | 17.1 | 16.0 | 14.6 | 0.23 |
| 940205 | 1600 | 0.28 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -28.0 | -31.0 | 18.9 | 19.6 | 14.0 | 0.23 |
| 940205 | 1900 | 0.25 | 0.113 | 0.113 | 8.87 | 8.87 | -36.0 | -36.0 | -31.6 | 22.6 | 23.1 | 18.4 | 0.28 |
| 940205 | 2200 | 0.25 | 0.113 | 0.113 | 8.87 | 8.87 | -34.0 | -36.0 | -31.7 | 21.1 | 20.6 | 14.6 | 0.29 |
| 940206 | 0100 | 0.31 | 0.142 | 0.113 | 7.04 | 8.87 | -42.0 | -40.0 | -37.2 | 22.2 | 20.7 | 14.2 | 0.23 |
| 940206 | 0400 | 0.32 | 0.132 | 0.113 | 7.56 | 8.87 | -40.0 | -28.0 | -33.2 | 22.2 | 23.8 | 17.4 | 0.21 |
| 940206 | 0700 | 0.28 | 0.142 | 0.103 | 7.04 | 9.71 | -40.0 | -40.0 | -33.0 | 25.4 | 23.6 | 19.9 | 0.26 |
| 940206 | 1000 | 0.28 | 0.123 | 0.113 | 8.16 | 8.87 | -20.0 | -20.0 | -27.9 | 25.0 | 24.9 | 19.2 | 0.27 |
| 940206 | 1300 | 0.31 | 0.123 | 0.113 | 8.16 | 8.87 | -38.0 | -38.0 | -29.2 | 26.7 | 28.1 | 20.1 | 0.28 |
| 940206 | 1600 | 0.35 | 0.113 | 0.113 | 8.87 | 8.87 | -36.0 | -36.0 | -23.7 | 37.7 | 28.5 | 19.0 | 0.25 |
| 940206 | 1900 | 0.39 | 0.123 | 0.113 | 8.16 | 8.87 | -36.0 | -36.0 | -17.3 | 36.7 | 22.8 | 23.8 | 0.21 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940206 | 2200 | 0.47 | 0.113 | 0.113 | 8.87 | 8.87 | -28.0 | -36.0 | -11.1 | 39.0 | 22.5 | 17.0 | 0.17 |
| 940207 | 0100 | 0.52 | 0.113 | 0.113 | 8.87 | 8.87 | -38.0 | 6.0 | -6.4 | 40.6 | 24.7 | 18.9 | 0.19 |
| 940207 | 0400 | 0.54 | 0.113 | 0.113 | 8.87 | 8.87 | -28.0 | -36.0 | -7.7 | 45.5 | 24.8 | 12.2 | 0.20 |
| 940207 | 0700 | 0.50 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -28.0 | -0.4 | 47.4 | 27.0 | 16.5 | 0.25 |
| 940207 | 1000 | 0.49 | 0.113 | 0.113 | 8.87 | 8.87 | -32.0 | -32.0 | -2.1 | 44.3 | 24.3 | 17.2 | 0.21 |
| 940207 | 1300 | 0.49 | 0.113 | 0.113 | 8.87 | 8.87 | -20.0 | -18.0 | -8.8 | 38.9 | 25.6 | 16.3 | 0.22 |
| 940207 | 1600 | 0.48 | 0.113 | 0.113 | 8.87 | 8.87 | -32.0 | -34.0 | -14.6 | 35.1 | 25.1 | 16.9 | 0.23 |
| 940207 | 1900 | 0.46 | 0.103 | 0.103 | 9.71 | 9.71 | -24.0 | -22.0 | -12.5 | 32.0 | 26.0 | 17.7 | 0.24 |
| 940207 | 2200 | 0.45 | 0.113 | 0.103 | 8.87 | 9.71 | -24.0 | -16.0 | -13.5 | 28.3 | 24.3 | 23.6 | 0.23 |
| 940208 | 0100 | 0.47 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -12.0 | -12.9 | 29.5 | 27.3 | 22.8 | 0.25 |
| 940208 | 0400 | 0.48 | 0.103 | 0.103 | 9.71 | 9.71 | -32.0 | -14.0 | -20.1 | 27.3 | 26.0 | 24.1 | 0.26 |
| 940208 | 0700 | 0.46 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | -16.0 | -22.3 | 26.0 | 24.5 | 22.2 | 0.28 |
| 940208 | 1000 | 0.47 | 0.103 | 0.103 | 9.71 | 9.71 | -26.0 | -16.0 | -17.2 | 25.1 | 23.4 | 21.1 | 0.25 |
| 940208 | 1300 | 0.48 | 0.103 | 0.093 | 9.71 | 10.72 | -32.0 | -32.0 | -27.4 | 25.8 | 24.1 | 20.3 | 0.27 |
| 940208 | 1600 | 0.47 | 0.093 | 0.093 | 10.72 | 10.72 | -36.0 | -34.0 | -34.6 | 29.2 | 25.3 | 25.9 | 0.28 |
| 940208 | 1900 | 0.47 | 0.093 | 0.093 | 10.72 | 10.72 | -16.0 | -36.0 | -34.4 | 36.8 | 22.2 | 22.6 | 0.24 |
| 940208 | 2200 | 0.47 | 0.103 | 0.093 | 9.71 | 10.72 | -30.0 | -32.0 | -45.3 | 40.3 | 23.4 | 23.5 | 0.28 |
| 940209 | 0100 | 0.55 | 0.132 | 0.093 | 7.56 | 10.72 | -42.0 | -40.0 | -44.6 | 37.8 | 25.3 | 20.5 | 0.23 |
| 940209 | 0400 | 0.63 | 0.132 | 0.093 | 7.56 | 10.72 | -46.0 | -42.0 | -39.6 | 36.6 | 37.5 | 17.9 | 0.24 |
| 940209 | 0700 | 0.68 | 0.123 | 0.093 | 8.16 | 10.72 | -42.0 | -42.0 | -31.7 | 58.0 | 46.5 | 17.6 | 0.25 |
| 940209 | 1000 | 0.72 | 0.132 | 0.123 | 7.56 | 8.16 | 20.0 | 20.0 | -13.8 | 62.3 | 46.2 | 49.9 | 0.20 |
| 940209 | 1300 | 0.74 | 0.123 | 0.132 | 8.16 | 7.56 | 14.0 | -40.0 | -25.7 | 58.7 | 47.9 | 57.4 | 0.16 |
| 940209 | 1600 | 0.77 | 0.123 | 0.132 | 8.16 | 7.56 | -40.0 | -40.0 | -17.7 | 66.4 | 51.4 | 21.3 | 0.21 |
| 940209 | 1900 | 0.80 | 0.123 | 0.132 | 8.16 | 7.56 | -44.0 | -44.0 | -13.0 | 68.9 | 64.0 | 64.9 | 0.23 |
| 940209 | 2200 | 1.50 | 0.250 | 0.220 | 4.01 | 4.54 | 46.0 | 44.0 | 35.4 | 20.5 | 17.9 | 15.0 | 0.22 |
| 940210 | 0100 | 2.11 | 0.162 | 0.152 | 6.19 | 6.59 | 20.0 | 20.0 | 30.2 | 23.6 | 19.5 | 13.9 | 0.19 |
| 940210 | 0400 | 2.11 | 0.132 | 0.152 | 7.56 | 6.59 | 14.0 | 16.0 | 32.4 | 26.8 | 21.1 | 18.8 | 0.20 |
| 940210 | 0700 | 2.18 | 0.142 | 0.132 | 7.04 | 7.56 | 18.0 | 20.0 | 28.5 | 25.1 | 20.8 | 15.3 | 0.19 |
| 940210 | 1000 | 2.10 | 0.142 | 0.142 | 7.04 | 7.04 | 22.0 | 22.0 | 27.0 | 23.5 | 20.6 | 14.8 | 0.17 |
| 940210 | 1300 | 2.11 | 0.132 | 0.132 | 7.56 | 7.56 | 18.0 | 18.0 | 27.7 | 24.5 | 22.0 | 12.1 | 0.16 |
| 940210 | 1600 | 2.02 | 0.103 | 0.142 | 9.71 | 7.04 | 10.0 | 12.0 | 24.2 | 26.7 | 23.2 | 18.4 | 0.16 |
| 940210 | 1900 | 2.04 | 0.142 | 0.142 | 7.04 | 7.04 | 18.0 | 16.0 | 24.5 | 28.2 | 24.5 | 16.4 | 0.17 |
| 940210 | 2200 | 2.08 | 0.152 | 0.152 | 6.59 | 6.59 | 14.0 | 12.0 | 23.8 | 29.1 | 24.7 | 19.1 | 0.16 |
| 940211 | 0100 | 1.85 | 0.152 | 0.152 | 6.59 | 6.59 | 16.0 | 12.0 | 20.2 | 27.6 | 24.9 | 18.0 | 0.14 |
| 940211 | 0400 | 1.71 | 0.142 | 0.142 | 7.04 | 7.04 | 16.0 | 14.0 | 18.9 | 32.1 | 29.7 | 20.2 | 0.13 |
| 940211 | 0700 | 1.63 | 0.152 | 0.152 | 6.59 | 6.59 | 12.0 | 10.0 | 17.0 | 38.8 | 35.2 | 36.9 | 0.14 |
| 940211 | 1000 | 1.47 | 0.093 | 0.142 | 10.72 | 7.04 | 2.0 | 4.0 | 18.5 | 35.3 | 29.3 | 31.5 | 0.14 |
| 940211 | 1300 | 1.34 | 0.103 | 0.142 | 9.71 | 7.04 | 2.0 | 8.0 | 11.9 | 35.2 | 29.6 | 37.5 | 0.11 |
| 940211 | 1600 | 1.32 | 0.103 | 0.152 | 9.71 | 6.59 | 4.0 | 14.0 | 20.4 | 36.1 | 34.5 | 52.0 | 0.15 |
| 940211 | 1900 | 1.37 | 0.113 | 0.113 | 8.87 | 8.87 | 10.0 | 12.0 | 21.6 | 36.3 | 29.0 | 19.5 | 0.19 |
| 940211 | 2200 | 1.46 | 0.308 | 0.113 | 3.25 | 8.87 | 50.0 | 48.0 | 28.5 | 32.4 | 20.6 | 22.3 | 0.23 |
| 940212 | 0100 | 1.55 | 0.171 | 0.171 | 5.83 | 5.83 | 20.0 | 16.0 | 27.5 | 28.0 | 18.4 | 15.1 | 0.20 |
| 940212 | 0400 | 1.72 | 0.152 | 0.152 | 6.59 | 6.59 | 18.0 | 18.0 | 26.7 | 25.8 | 19.3 | 12.3 | 0.18 |
| 940212 | 0700 | 1.72 | 0.142 | 0.113 | 7.04 | 8.87 | 16.0 | 16.0 | 27.8 | 27.5 | 20.5 | 21.5 | 0.20 |
| 940212 | 1000 | 1.62 | 0.103 | 0.103 | 9.71 | 9.71 | 8.0 | 14.0 | 25.0 | 26.1 | 18.6 | 13.4 | 0.19 |
| 940212 | 1300 | 1.58 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 14.0 | 22.3 | 28.0 | 18.3 | 16.6 | 0.18 |
| 940212 | 1600 | 1.45 | 0.103 | 0.103 | 9.71 | 9.71 | 12.0 | 12.0 | 21.6 | 25.6 | 19.5 | 15.7 | 0.16 |
| 940212 | 1900 | 1.38 | 0.103 | 0.103 | 9.71 | 9.71 | 10.0 | 12.0 | 19.5 | 25.2 | 20.0 | 17.8 | 0.20 |
| 940212 | 2200 | 1.31 | 0.103 | 0.103 | 9.71 | 9.71 | 12.0 | 12.0 | 17.3 | 22.7 | 18.6 | 16.3 | 0.19 |
| 940213 | 0100 | 1.18 | 0.093 | 0.093 | 10.72 | 10.72 | 16.0 | 12.0 | 15.3 | 19.3 | 18.4 | 16.1 | 0.14 |
| 940213 | 0400 | 1.10 | 0.093 | 0.093 | 10.72 | 10.72 | 14.0 | 14.0 | 15.7 | 20.4 | 19.0 | 18.2 | 0.15 |
| 940213 | 0700 | 1.02 | 0.093 | 0.093 | 10.72 | 10.72 | 10.0 | 12.0 | 14.0 | 22.3 | 20.5 | 18.0 | 0.25 |
| 940213 | 1000 | 0.98 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 8.0 | 11.4 | 19.2 | 19.1 | 12.2 | 0.25 |
| 940213 | 1300 | 0.83 | 0.093 | 0.093 | 10.72 | 10.72 | 10.0 | 10.0 | 12.1 | 22.8 | 22.8 | 20.7 | 0.20 |
| 940213 | 1600 | 0.86 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 8.0 | 9.3 | 20.2 | 21.0 | 19.1 | 0.22 |
| 940213 | 1900 | 0.82 | 0.093 | 0.093 | 10.72 | 10.72 | 12.0 | 10.0 | 13.0 | 22.0 | 24.6 | 20.7 | 0.26 |
| 940213 | 2200 | 0.71 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | 10.0 | 3.6 | 24.1 | 29.2 | 18.5 | 0.38 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940214 | 0100 | 0.73 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 8.0 | 17.1 | 30.8 | 21.0 | 18.8 | 0.21 |
| 940214 | 0400 | 0.71 | 0.093 | 0.093 | 10.72 | 10.72 | 2.0 | 2.0 | 17.7 | 34.2 | 16.2 | 16.0 | 0.18 |
| 940214 | 0700 | 0.78 | 0.201 | 0.093 | 4.98 | 10.72 | 44.0 | 46.0 | 27.6 | 35.6 | 14.4 | 16.7 | 0.18 |
| 940214 | 1000 | 0.68 | 0.152 | 0.103 | 6.59 | 9.71 | 22.0 | 46.0 | 25.6 | 32.9 | 16.9 | 25.1 | 0.19 |
| 940214 | 1300 | 0.64 | 0.162 | 0.103 | 6.19 | 9.71 | 30.0 | 30.0 | 21.8 | 30.5 | 16.4 | 15.9 | 0.17 |
| 940214 | 1600 | 0.56 | 0.171 | 0.093 | 5.83 | 10.72 | 26.0 | 26.0 | 19.5 | 30.0 | 18.9 | 22.1 | 0.16 |
| 940214 | 1900 | 0.45 | 0.093 | 0.093 | 10.72 | 10.72 | 12.0 | 16.0 | 17.5 | 33.3 | 23.5 | 31.0 | 0.19 |
| 940214 | 2200 | 0.40 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 14.0 | 15.9 | 36.6 | 38.8 | 24.4 | 0.23 |
| 940215 | 0100 | 0.39 | 0.093 | 0.093 | 10.72 | 10.72 | -2.0 | 12.0 | 12.2 | 39.1 | 41.6 | 27.2 | 0.29 |
| 940215 | 0400 | 0.43 | 0.103 | 0.162 | 9.71 | 6.19 | -10.0 | 18.0 | 0.8 | 37.5 | 33.9 | 18.5 | 0.19 |
| 940215 | 0700 | 0.46 | 0.162 | 0.162 | 6.19 | 6.19 | 20.0 | 20.0 | 9.3 | 35.1 | 29.0 | 11.3 | 0.18 |
| 940215 | 1000 | 0.42 | 0.132 | 0.142 | 7.56 | 7.04 | 18.0 | 18.0 | 9.9 | 38.2 | 27.7 | 17.0 | 0.21 |
| 940215 | 1300 | 0.37 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 22.0 | 9.3 | 38.7 | 32.2 | 17.8 | 0.20 |
| 940215 | 1600 | 0.35 | 0.142 | 0.162 | 7.04 | 6.19 | 14.0 | -50.0 | -16.5 | 51.4 | 29.5 | 22.4 | 0.20 |
| 940215 | 1900 | 0.29 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | -46.0 | -26.0 | 44.2 | 30.2 | 32.4 | 0.25 |
| 940215 | 2200 | 0.24 | 0.103 | 0.093 | 9.71 | 10.72 | -34.0 | -38.0 | -34.2 | 34.9 | 29.6 | 32.3 | 0.28 |
| 940216 | 0100 | 0.24 | 0.093 | 0.093 | 10.72 | 10.72 | -30.0 | -34.0 | -31.1 | 31.7 | 25.0 | 27.7 | 0.29 |
| 940216 | 0400 | 0.24 | 0.132 | 0.093 | 7.56 | 10.72 | -40.0 | -40.0 | -32.6 | 37.6 | 30.0 | 30.5 | 0.29 |
| 940216 | 0700 | 0.25 | 0.103 | 0.103 | 9.71 | 9.71 | -30.0 | -36.0 | -30.0 | 40.8 | 30.1 | 34.3 | 0.31 |
| 940216 | 1000 | 0.26 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | -36.0 | -29.1 | 40.2 | 38.3 | 32.5 | 0.27 |
| 940216 | 1300 | 0.34 | 0.318 | 0.318 | 3.15 | 3.15 | 46.0 | 46.0 | 10.2 | 65.2 | 35.8 | 25.4 | 0.26 |
| 940216 | 1600 | 0.38 | 0.191 | 0.103 | 5.24 | 9.71 | 14.0 | 10.0 | 6.7 | 33.5 | 29.8 | 35.8 | 0.17 |
| 940216 | 1900 | 0.49 | 0.162 | 0.162 | 6.19 | 6.19 | 12.0 | 14.0 | 11.3 | 27.8 | 24.2 | 7.4 | 0.16 |
| 940216 | 2200 | 0.48 | 0.171 | 0.201 | 5.83 | 4.98 | 18.0 | 18.0 | 16.2 | 28.3 | 23.5 | 10.6 | 0.17 |
| 940217 | 0100 | 0.46 | 0.171 | 0.093 | 5.83 | 10.72 | 20.0 | 20.0 | 21.0 | 36.4 | 26.2 | 36.3 | 0.18 |
| 940217 | 0400 | 0.43 | 0.181 | 0.103 | 5.52 | 9.71 | 28.0 | 18.0 | 16.6 | 39.0 | 26.1 | 32.2 | 0.16 |
| 940217 | 0700 | 0.48 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | 8.0 | 3.3 | 34.8 | 29.3 | 26.0 | 0.14 |
| 940217 | 1000 | 0.54 | 0.171 | 0.123 | 5.83 | 8.16 | -24.0 | -12.0 | 1.9 | 34.8 | 31.1 | 27.0 | 0.18 |
| 940217 | 1300 | 0.56 | 0.201 | 0.123 | 4.98 | 8.16 | 22.0 | -12.0 | 5.8 | 35.7 | 31.0 | 20.5 | 0.17 |
| 940217 | 1600 | 0.60 | 0.123 | 0.123 | 8.16 | 8.16 | 0.0 | 10.0 | 11.0 | 33.2 | 30.0 | 16.1 | 0.12 |
| 940217 | 1900 | 0.62 | 0.142 | 0.132 | 7.04 | 7.56 | 4.0 | 6.0 | 11.2 | 33.1 | 27.3 | 17.9 | 0.13 |
| 940217 | 2200 | 0.62 | 0.152 | 0.181 | 6.59 | 5.52 | -10.0 | -10.0 | 9.8 | 38.8 | 30.6 | 25.6 | 0.17 |
| 940218 | 0100 | 0.54 | 0.162 | 0.113 | 6.19 | 8.87 | 12.0 | 2.0 | 10.1 | 37.5 | 33.3 | 30.7 | 0.19 |
| 940218 | 0400 | 0.50 | 0.132 | 0.132 | 7.56 | 7.56 | 0.0 | 2.0 | 8.4 | 33.5 | 33.2 | 19.4 | 0.17 |
| 940218 | 0700 | 0.50 | 0.142 | 0.113 | 7.04 | 8.87 | -8.0 | 4.0 | -2.6 | 32.1 | 33.7 | 32.8 | 0.17 |
| 940218 | 1000 | 0.53 | 0.113 | 0.113 | 8.87 | 8.87 | -2.0 | 2.0 | 3.9 | 32.7 | 35.1 | 27.7 | 0.18 |
| 940218 | 1300 | 0.54 | 0.093 | 0.103 | 10.72 | 9.71 | 12.0 | 10.0 | -6.5 | 34.4 | 34.6 | 35.0 | 0.24 |
| 940218 | 1600 | 0.58 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | 6.0 | -3.2 | 31.4 | 29.9 | 23.9 | 0.18 |
| 940218 | 1900 | 0.63 | 0.103 | 0.103 | 9.71 | 9.71 | 8.0 | 2.0 | -2.8 | 30.2 | 28.3 | 23.8 | 0.20 |
| 940218 | 2200 | 0.70 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | -8.0 | -11.2 | 30.5 | 28.9 | 26.2 | 0.23 |
| 940219 | 0100 | 0.73 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | -10.0 | -20.1 | 33.2 | 28.7 | 25.9 | 0.23 |
| 940219 | 0400 | 0.74 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | -8.0 | -20.1 | 35.6 | 24.6 | 25.9 | 0.19 |
| 940219 | 0700 | 0.80 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | -40.0 | -23.9 | 37.5 | 22.5 | 23.4 | 0.16 |
| 940219 | 1000 | 0.81 | 0.083 | 0.103 | 11.98 | 9.71 | -4.0 | -40.0 | -29.1 | 34.4 | 24.1 | 27.2 | 0.18 |
| 940219 | 1300 | 0.83 | 0.093 | 0.093 | 10.72 | 10.72 | -8.0 | -40.0 | -34.6 | 33.3 | 24.5 | 19.3 | 0.15 |
| 940219 | 1600 | 0.86 | 0.142 | 0.113 | 7.04 | 8.87 | -42.0 | -38.0 | -35.6 | 29.8 | 24.1 | 22.2 | 0.15 |
| 940219 | 1900 | 0.96 | 0.123 | 0.123 | 8.16 | 8.16 | -34.0 | -38.0 | -34.4 | 26.5 | 23.3 | 17.8 | 0.14 |
| 940219 | 2200 | 1.04 | 0.103 | 0.103 | 9.71 | 9.71 | -24.0 | -38.0 | -34.2 | 26.0 | 24.5 | 23.7 | 0.15 |
| 940220 | 0100 | 1.07 | 0.113 | 0.103 | 8.87 | 9.71 | -28.0 | -38.0 | -36.4 | 25.0 | 24.1 | 27.4 | 0.19 |
| 940220 | 0400 | 1.12 | 0.113 | 0.103 | 8.87 | 9.71 | -26.0 | -38.0 | -33.3 | 22.5 | 22.4 | 21.2 | 0.15 |
| 940220 | 0700 | 1.14 | 0.113 | 0.103 | 8.87 | 9.71 | -30.0 | -28.0 | -29.4 | 22.0 | 21.8 | 26.9 | 0.14 |
| 940220 | 1000 | 1.19 | 0.103 | 0.103 | 9.71 | 9.71 | -26.0 | -28.0 | -31.3 | 22.4 | 21.4 | 22.4 | 0.14 |
| 940220 | 1300 | 1.22 | 0.093 | 0.093 | 10.72 | 10.72 | -28.0 | -30.0 | -32.1 | 20.4 | 19.7 | 15.6 | 0.16 |
| 940220 | 1600 | 1.18 | 0.103 | 0.103 | 9.71 | 9.71 | -28.0 | -26.0 | -30.4 | 22.5 | 22.2 | 19.8 | 0.17 |
| 940220 | 1900 | 1.21 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | -30.0 | -33.6 | 21.3 | 21.1 | 19.0 | 0.15 |
| 940220 | 2200 | 1.30 | 0.093 | 0.093 | 10.72 | 10.72 | -24.0 | -24.0 | -30.1 | 21.3 | 21.3 | 17.7 | 0.15 |
| 940221 | 0100 | 1.32 | 0.103 | 0.103 | 9.71 | 9.71 | -26.0 | -26.0 | -30.6 | 20.5 | 20.2 | 16.3 | 0.19 |
| 940221 | 0400 | 1.25 | 0.093 | 0.093 | 10.72 | 10.72 | -30.0 | -28.0 | -31.5 | 22.3 | 21.4 | 19.6 | 0.18 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940221 | 0700 | 1.19 | 0.093 | 0.093 | 10.72 | 10.72 | -24.0 | -24.0 | -29.3 | 23.0 | 23.0 | 22.6 | 0.15 |
| 940221 | 1000 | 1.20 | 0.093 | 0.093 | 10.72 | 10.72 | -34.0 | -34.0 | -27.9 | 21.8 | 21.7 | 14.0 | 0.14 |
| 940221 | 1300 | 1.22 | 0.093 | 0.093 | 10.72 | 10.72 | -24.0 | -24.0 | -30.3 | 22.7 | 22.5 | 17.0 | 0.19 |
| 940221 | 1600 | 1.19 | 0.093 | 0.093 | 10.72 | 10.72 | -18.0 | -24.0 | -27.9 | 23.0 | 22.2 | 21.4 | 0.17 |
| 940221 | 1900 | 1.24 | 0.093 | 0.093 | 10.72 | 10.72 | -32.0 | -24.0 | -26.5 | 19.9 | 19.7 | 14.3 | 0.15 |
| 940221 | 2200 | 1.10 | 0.093 | 0.093 | 10.72 | 10.72 | -22.0 | -24.0 | -24.6 | 23.5 | 23.1 | 17.6 | 0.14 |
| 940222 | 0100 | 1.11 | 0.093 | 0.093 | 10.72 | 10.72 | -22.0 | -22.0 | -14.7 | 26.3 | 21.9 | 15.0 | 0.16 |
| 940222 | 0400 | 0.98 | 0.093 | 0.093 | 10.72 | 10.72 | -22.0 | -22.0 | -20.2 | 26.6 | 24.8 | 22.7 | 0.20 |
| 940222 | 0700 | 0.97 | 0.093 | 0.093 | 10.72 | 10.72 | -34.0 | -14.0 | -15.5 | 30.8 | 24.9 | 24.4 | 0.17 |
| 940222 | 1000 | 0.95 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | -10.0 | 0.0 | 37.3 | 23.4 | 23.4 | 0.12 |
| 940222 | 1300 | 1.02 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -12.0 | -1.9 | 32.0 | 23.2 | 20.4 | 0.13 |
| 940222 | 1600 | 1.01 | 0.103 | 0.103 | 9.71 | 9.71 | -26.0 | -8.0 | 0.8 | 39.2 | 24.5 | 24.2 | 0.16 |
| 940222 | 1900 | 1.01 | 0.103 | 0.103 | 9.71 | 9.71 | -20.0 | 6.0 | 5.3 | 36.9 | 24.2 | 24.5 | 0.14 |
| 940222 | 2200 | 1.00 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | 18.0 | 5.5 | 37.8 | 24.1 | 18.4 | 0.11 |
| 940223 | 0100 | 1.20 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | 18.0 | 6.2 | 38.0 | 27.5 | 20.2 | 0.11 |
| 940223 | 0400 | 1.10 | 0.103 | 0.103 | 9.71 | 9.71 | -24.0 | 2.0 | 10.6 | 44.8 | 31.4 | 21.2 | 0.14 |
| 940223 | 0700 | 1.09 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | 2.0 | 7.4 | 41.7 | 34.4 | 22.9 | 0.12 |
| 940223 | 1000 | 1.20 | 0.162 | 0.162 | 6.19 | 6.19 | -34.0 | -32.0 | -31.8 | 41.4 | 44.2 | 48.0 | 0.12 |
| 940223 | 1300 | 1.36 | 0.142 | 0.132 | 7.04 | 7.56 | -40.0 | -38.0 | -25.5 | 39.0 | 41.4 | 30.3 | 0.12 |
| 940223 | 1600 | 1.42 | 0.123 | 0.132 | 8.16 | 7.56 | -8.0 | -12.0 | -8.0 | 40.1 | 40.5 | 32.3 | 0.12 |
| 940223 | 1900 | 1.28 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -40.0 | -12.8 | 43.8 | 44.0 | 39.0 | 0.13 |
| 940223 | 2200 | 1.26 | 0.132 | 0.132 | 7.56 | 7.56 | -38.0 | -38.0 | -13.3 | 46.2 | 46.1 | 44.3 | 0.11 |
| 940224 | 0100 | 1.33 | 0.132 | 0.113 | 7.56 | 8.87 | 14.0 | 12.0 | -1.1 | 44.6 | 41.2 | 36.2 | 0.14 |
| 940224 | 0400 | 1.31 | 0.123 | 0.113 | 8.16 | 8.87 | 12.0 | 12.0 | -6.0 | 50.2 | 45.3 | 33.7 | 0.17 |
| 940224 | 0700 | 1.23 | 0.123 | 0.113 | 8.16 | 8.87 | -42.0 | 6.0 | -17.0 | 52.9 | 48.4 | 38.5 | 0.18 |
| 940224 | 1000 | 1.07 | 0.123 | 0.113 | 8.16 | 8.87 | -42.0 | 10.0 | -15.9 | 48.6 | 46.9 | 36.4 | 0.14 |
| 940224 | 1300 | 0.98 | 0.123 | 0.103 | 8.16 | 9.71 | -42.0 | 10.0 | -6.5 | 48.8 | 43.5 | 35.3 | 0.14 |
| 940224 | 1600 | 0.98 | 0.103 | 0.113 | 9.71 | 8.87 | -38.0 | -40.0 | -21.6 | 51.8 | 50.4 | 41.2 | 0.20 |
| 940224 | 1900 | 0.85 | 0.123 | 0.113 | 8.16 | 8.87 | -38.0 | -42.0 | -9.9 | 52.5 | 50.3 | 44.5 | 0.23 |
| 940224 | 2200 | 0.74 | 0.113 | 0.113 | 8.87 | 8.87 | -36.0 | 4.0 | -12.7 | 45.7 | 45.4 | 36.5 | 0.14 |
| 940225 | 0100 | 0.66 | 0.113 | 0.113 | 8.87 | 8.87 | -38.0 | 12.0 | 4.7 | 44.7 | 44.9 | 34.9 | 0.15 |
| 940225 | 0400 | 0.58 | 0.103 | 0.113 | 9.71 | 8.87 | -36.0 | -36.0 | -1.7 | 52.5 | 44.4 | 34.8 | 0.21 |
| 940225 | 0700 | 0.53 | 0.103 | 0.103 | 9.71 | 9.71 | -40.0 | -40.0 | -11.2 | 54.3 | 50.8 | 34.8 | 0.25 |
| 940225 | 1000 | 0.48 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | -36.0 | -0.8 | 49.3 | 41.1 | 32.0 | 0.20 |
| 940225 | 1300 | 0.59 | 0.113 | 0.113 | 8.87 | 8.87 | -34.0 | 14.0 | -0.1 | 41.2 | 25.2 | 27.7 | 0.15 |
| 940225 | 1600 | 0.60 | 0.171 | 0.113 | 5.83 | 8.87 | 18.0 | 16.0 | -2.1 | 45.4 | 28.4 | 34.6 | 0.20 |
| 940225 | 1900 | 0.51 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | 12.0 | -9.7 | 46.0 | 33.7 | 25.6 | 0.23 |
| 940225 | 2200 | 0.48 | 0.123 | 0.113 | 8.16 | 8.87 | -34.0 | -34.0 | -10.6 | 39.2 | 34.4 | 26.5 | 0.18 |
| 940226 | 0100 | 0.46 | 0.308 | 0.113 | 3.25 | 8.87 | -56.0 | -32.0 | -20.3 | 36.6 | 28.4 | 25.1 | 0.19 |
| 940226 | 0400 | 0.43 | 0.152 | 0.113 | 6.59 | 8.87 | -40.0 | -38.0 | -29.4 | 33.2 | 29.5 | 21.5 | 0.22 |
| 940226 | 0700 | 0.46 | 0.142 | 0.132 | 7.04 | 7.56 | -42.0 | -42.0 | -37.8 | 29.5 | 25.4 | 23.0 | 0.21 |
| 940226 | 1000 | 0.88 | 0.269 | 0.269 | 3.72 | 3.72 | 62.0 | 62.0 | 40.9 | 28.1 | 18.8 | 15.8 | 0.27 |
| 940226 | 1300 | 1.27 | 0.181 | 0.181 | 5.52 | 5.52 | 36.0 | 38.0 | 42.8 | 18.7 | 16.9 | 11.9 | 0.19 |
| 940226 | 1600 | 1.75 | 0.162 | 0.162 | 6.19 | 6.19 | 40.0 | 38.0 | 42.8 | 21.3 | 18.0 | 12.1 | 0.22 |
| 940226 | 1900 | 1.60 | 0.152 | 0.162 | 6.59 | 6.19 | 40.0 | 54.0 | 44.6 | 22.9 | 16.5 | 14.0 | 0.27 |
| 940226 | 2200 | 1.67 | 0.142 | 0.162 | 7.04 | 6.19 | 24.0 | 40.0 | 37.8 | 21.4 | 13.6 | 12.3 | 0.23 |
| 940227 | 0100 | 1.41 | 0.142 | 0.152 | 7.04 | 6.59 | 20.0 | 42.0 | 34.4 | 22.4 | 14.9 | 14.6 | 0.19 |
| 940227 | 0400 | 1.32 | 0.171 | 0.152 | 5.83 | 6.59 | 36.0 | 38.0 | 33.8 | 18.9 | 13.1 | 13.3 | 0.21 |
| 940227 | 0700 | 1.40 | 0.152 | 0.152 | 6.59 | 6.59 | 32.0 | 36.0 | 35.9 | 22.0 | 13.5 | 10.1 | 0.28 |
| 940227 | 1000 | 1.54 | 0.152 | 0.113 | 6.59 | 8.87 | 30.0 | 36.0 | 33.1 | 22.9 | 12.4 | 16.9 | 0.24 |
| 940227 | 1300 | 1.28 | 0.152 | 0.113 | 6.59 | 8.87 | 22.0 | 22.0 | 28.5 | 25.1 | 15.2 | 14.1 | 0.19 |
| 940227 | 1600 | 1.30 | 0.123 | 0.123 | 8.16 | 8.16 | 12.0 | 16.0 | 25.7 | 24.0 | 18.3 | 11.4 | 0.15 |
| 940227 | 1900 | 1.19 | 0.123 | 0.123 | 8.16 | 8.16 | 12.0 | 14.0 | 23.1 | 21.4 | 17.3 | 9.4 | 0.19 |
| 940227 | 2200 | 1.09 | 0.123 | 0.123 | 8.16 | 8.16 | 12.0 | 24.0 | 25.2 | 22.3 | 14.9 | 9.9 | 0.19 |
| 940228 | 0100 | 1.20 | 0.142 | 0.123 | 7.04 | 8.16 | 20.0 | 22.0 | 28.9 | 25.5 | 16.3 | 15.5 | 0.16 |
| 940228 | 0400 | 1.13 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 24.0 | 26.9 | 24.9 | 17.6 | 9.0 | 0.14 |
| 940228 | 0700 | 0.99 | 0.171 | 0.171 | 5.83 | 5.83 | 26.0 | 22.0 | 22.9 | 25.0 | 18.0 | 10.5 | 0.18 |
| 940228 | 1000 | 0.94 | 0.162 | 0.162 | 6.19 | 6.19 | 30.0 | 32.0 | 24.6 | 23.9 | 17.5 | 10.3 | 0.15 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940228 | 1300 | 0.86 | 0.132 | 0.123 | 7.56 | 8.16 | 12.0 | 16.0 | 17.3 | 22.2 | 16.9 | 16.5 | 0.11 |
| 940228 | 1600 | 0.87 | 0.132 | 0.132 | 7.56 | 7.56 | 14.0 | 16.0 | 13.3 | 19.9 | 16.6 | 11.1 | 0.11 |
| 940228 | 1900 | 0.81 | 0.132 | 0.132 | 7.56 | 7.56 | 12.0 | 14.0 | 12.9 | 22.7 | 17.2 | 12.6 | 0.17 |
| 940228 | 2200 | 0.70 | 0.132 | 0.132 | 7.56 | 7.56 | 16.0 | 20.0 | 14.6 | 27.5 | 17.0 | 13.2 | 0.17 |
| 940301 | 0100 | 0.64 | 0.103 | 0.113 | 9.71 | 8.87 | -8.0 | -8.0 | 10.5 | 30.2 | 17.7 | 14.9 | 0.13 |
| 940301 | 0400 | 0.61 | 0.123 | 0.113 | 8.16 | 8.87 | -10.0 | 14.0 | 10.3 | 29.7 | 17.8 | 16.2 | 0.14 |
| 940301 | 0700 | 0.55 | 0.162 | 0.162 | 6.19 | 6.19 | 14.0 | 14.0 | 6.4 | 27.1 | 19.7 | 10.8 | 0.18 |
| 940301 | 1000 | 0.48 | 0.181 | 0.113 | 5.52 | 8.87 | 16.0 | 16.0 | 7.2 | 29.3 | 20.8 | 18.6 | 0.21 |
| 940301 | 1300 | 0.50 | 0.113 | 0.123 | 8.87 | 8.16 | 0.0 | 16.0 | 10.5 | 31.2 | 23.8 | 15.2 | 0.15 |
| 940301 | 1600 | 0.51 | 0.064 | 0.318 | 15.63 | 3.15 | -12.0 | -10.0 | 8.2 | 35.1 | 28.8 | 31.8 | 0.18 |
| 940301 | 1900 | 1.10 | 0.210 | 0.220 | 4.75 | 4.54 | 20.0 | 18.0 | 13.2 | 33.0 | 30.2 | 28.1 | 0.12 |
| 940301 | 2200 | 1.59 | 0.181 | 0.181 | 5.52 | 5.52 | 12.0 | 12.0 | 19.5 | 28.9 | 27.8 | 21.0 | 0.13 |
| 940302 | 0100 | 1.90 | 0.152 | 0.152 | 6.59 | 6.59 | 12.0 | 12.0 | 19.0 | 22.8 | 23.2 | 15.7 | 0.11 |
| 940302 | 0400 | 2.14 | 0.142 | 0.142 | 7.04 | 7.04 | 10.0 | 10.0 | 13.7 | 26.4 | 27.2 | 21.4 | 0.09 |
| 940302 | 0700 | 2.04 | 0.132 | 0.132 | 7.56 | 7.56 | 12.0 | 10.0 | 10.8 | 35.2 | 35.4 | 26.1 | 0.10 |
| 940302 | 1000 | 2.06 | 0.132 | 0.132 | 7.56 | 7.56 | 10.0 | 8.0 | -10.2 | 46.0 | 45.2 | 34.3 | 0.15 |
| 940302 | 1300 | 3.01 | 0.113 | 0.113 | 8.87 | 8.87 | -28.0 | -28.0 | -29.7 | 28.0 | 29.6 | 16.0 | 0.23 |
| 940302 | 1600 | 3.11 | 0.093 | 0.093 | 10.72 | 10.72 | -26.0 | -26.0 | -25.2 | 21.2 | 24.4 | 13.0 | 0.25 |
| 940302 | 1900 | 3.01 | 0.093 | 0.083 | 10.72 | 11.98 | -28.0 | -30.0 | -28.2 | 25.4 | 26.9 | 19.8 | 0.24 |
| 940302 | 2200 | 2.92 | 0.083 | 0.083 | 11.98 | 11.98 | -36.0 | -34.0 | -26.9 | 24.5 | 25.5 | 14.3 | 0.23 |
| 940303 | 0100 | 2.22 | 0.074 | 0.074 | 13.56 | 13.56 | -30.0 | -32.0 | -19.9 | 32.9 | 30.7 | 19.8 | 0.20 |
| 940303 | 0400 | 2.31 | 0.074 | 0.074 | 13.56 | 13.56 | -32.0 | -32.0 | -20.2 | 27.3 | 25.9 | 18.7 | 0.21 |
| 940303 | 0700 | 2.07 | 0.074 | 0.074 | 13.56 | 13.56 | -30.0 | -30.0 | -18.9 | 32.9 | 29.4 | 21.0 | 0.20 |
| 940303 | 1000 | 2.01 | 0.083 | 0.083 | 11.98 | 11.98 | -36.0 | -34.0 | -22.9 | 36.0 | 33.9 | 32.0 | 0.21 |
| 940303 | 1300 | 1.85 | 0.074 | 0.083 | 13.56 | 11.98 | -34.0 | -32.0 | -20.9 | 35.8 | 34.2 | 32.7 | 0.20 |
| 940303 | 1600 | 1.62 | 0.083 | 0.083 | 11.98 | 11.98 | -12.0 | 8.0 | -1.7 | 38.2 | 32.2 | 37.3 | 0.18 |
| 940303 | 1900 | 1.61 | 0.083 | 0.083 | 11.98 | 11.98 | 6.0 | 8.0 | 12.9 | 40.1 | 32.8 | 33.3 | 0.16 |
| 940303 | 2200 | 1.45 | 0.083 | 0.083 | 11.98 | 11.98 | 2.0 | -6.0 | 11.7 | 46.7 | 29.5 | 33.4 | 0.26 |
| 940304 | 0100 | 1.28 | 0.083 | 0.083 | 11.98 | 11.98 | -2.0 | 10.0 | 7.6 | 43.0 | 27.8 | 30.2 | 0.26 |
| 940304 | 0400 | 1.11 | 0.074 | 0.083 | 13.56 | 11.98 | 0.0 | 4.0 | 13.7 | 37.4 | 24.2 | 30.7 | 0.20 |
| 940304 | 0700 | 1.03 | 0.083 | 0.083 | 11.98 | 11.98 | 10.0 | 16.0 | 11.8 | 34.9 | 25.6 | 29.2 | 0.16 |
| 940304 | 1000 | 0.94 | 0.074 | 0.083 | 13.56 | 11.98 | 4.0 | 14.0 | 11.3 | 35.3 | 26.6 | 29.1 | 0.23 |
| 940304 | 1300 | 0.91 | 0.083 | 0.083 | 11.98 | 11.98 | 6.0 | 12.0 | 1.6 | 35.9 | 28.0 | 27.2 | 0.34 |
| 940304 | 1600 | 0.81 | 0.083 | 0.083 | 11.98 | 11.98 | 6.0 | 8.0 | 7.3 | 37.8 | 34.9 | 29.7 | 0.22 |
| 940304 | 1900 | 0.77 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | 10.0 | -0.9 | 38.2 | 31.7 | 26.4 | 0.20 |
| 940304 | 2200 | 0.68 | 0.083 | 0.083 | 11.98 | 11.98 | 2.0 | 10.0 | -15.0 | 41.7 | 34.8 | 28.8 | 0.24 |
| 940305 | 0100 | 0.70 | 0.074 | 0.083 | 13.56 | 11.98 | 10.0 | 10.0 | -1.4 | 53.3 | 46.0 | 32.0 | 0.27 |
| 940305 | 0400 | 0.70 | 0.074 | 0.083 | 13.56 | 11.98 | 0.0 | 44.0 | 10.3 | 50.3 | 31.2 | 32.4 | 0.21 |
| 940305 | 0700 | 0.65 | 0.083 | 0.083 | 11.98 | 11.98 | 6.0 | 10.0 | 4.4 | 40.9 | 30.1 | 27.9 | 0.18 |
| 940305 | 1000 | 0.67 | 0.074 | 0.083 | 13.56 | 11.98 | 4.0 | 6.0 | 4.9 | 32.3 | 25.4 | 25.9 | 0.21 |
| 940305 | 1300 | 0.74 | 0.181 | 0.064 | 5.52 | 15.63 | 12.0 | 12.0 | 5.9 | 26.3 | 23.6 | 24.1 | 0.20 |
| 940305 | 1600 | 0.67 | 0.074 | 0.064 | 13.56 | 15.63 | 6.0 | 10.0 | 4.0 | 29.2 | 23.2 | 22.6 | 0.24 |
| 940305 | 1900 | 0.60 | 0.074 | 0.074 | 13.56 | 13.56 | 6.0 | -2.0 | 2.6 | 30.9 | 24.5 | 21.0 | 0.20 |
| 940305 | 2200 | 0.54 | 0.074 | 0.074 | 13.56 | 13.56 | 8.0 | 10.0 | 3.3 | 32.9 | 27.1 | 21.7 | 0.25 |
| 940306 | 0100 | 0.51 | 0.074 | 0.074 | 13.56 | 13.56 | 8.0 | 10.0 | 2.4 | 34.1 | 27.2 | 19.9 | 0.21 |
| 940306 | 0400 | 0.57 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | 10.0 | 12.1 | 48.1 | 30.5 | 26.4 | 0.19 |
| 940306 | 0700 | 0.69 | 0.250 | 0.083 | 4.01 | 11.98 | 24.0 | 8.0 | 9.5 | 34.2 | 26.0 | 23.8 | 0.14 |
| 940306 | 1000 | 0.81 | 0.181 | 0.240 | 5.52 | 4.17 | 6.0 | 6.0 | 17.1 | 32.6 | 26.9 | 27.7 | 0.14 |
| 940306 | 1300 | 0.90 | 0.171 | 0.171 | 5.83 | 5.83 | 22.0 | 20.0 | 22.9 | 33.8 | 27.3 | 14.3 | 0.14 |
| 940306 | 1600 | 0.88 | 0.162 | 0.162 | 6.19 | 6.19 | 36.0 | 40.0 | 25.8 | 33.0 | 24.5 | 20.2 | 0.17 |
| 940306 | 1900 | 0.80 | 0.152 | 0.152 | 6.59 | 6.59 | 22.0 | 22.0 | 25.1 | 31.5 | 23.6 | 16.9 | 0.13 |
| 940306 | 2200 | 0.67 | 0.162 | 0.162 | 6.19 | 6.19 | 22.0 | 40.0 | 22.1 | 38.9 | 29.0 | 24.6 | 0.16 |
| 940307 | 0100 | 0.60 | 0.132 | 0.083 | 7.56 | 11.98 | 4.0 | 6.0 | 19.1 | 39.4 | 27.1 | 23.3 | 0.18 |
| 940307 | 0400 | 0.52 | 0.074 | 0.074 | 13.56 | 13.56 | -8.0 | 6.0 | 14.7 | 40.7 | 31.4 | 23.8 | 0.21 |
| 940307 | 0700 | 0.48 | 0.074 | 0.074 | 13.56 | 13.56 | 10.0 | 6.0 | 9.3 | 37.5 | 32.2 | 24.2 | 0.20 |
| 940307 | 1000 | 0.50 | 0.083 | 0.074 | 11.98 | 13.56 | -6.0 | -10.0 | -14.4 | 40.8 | 36.7 | 24.7 | 0.18 |
| 940307 | 1300 | 0.51 | 0.083 | 0.083 | 11.98 | 11.98 | -6.0 | -10.0 | -33.0 | 48.9 | 37.8 | 21.5 | 0.21 |
| 940307 | 1600 | 0.54 | 0.074 | 0.083 | 13.56 | 11.98 | -12.0 | -40.0 | -45.4 | 52.4 | 32.0 | 24.7 | 0.23 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940307 | 1900 | 0.52 | 0.181 | 0.074 | 5.52 | 13.56 | -54.0 | -40.0 | -37.2 | 44.4 | 26.3 | 23.9 | 0.23 |
| 940307 | 2200 | 0.51 | 0.083 | 0.083 | 11.98 | 11.98 | 10.0 | -38.0 | -30.2 | 38.8 | 25.5 | 24.9 | 0.18 |
| 940308 | 0100 | 0.53 | 0.171 | 0.171 | 5.83 | 5.83 | -50.0 | -48.0 | -35.4 | 35.4 | 23.4 | 13.3 | 0.19 |
| 940308 | 0400 | 0.56 | 0.162 | 0.162 | 6.19 | 6.19 | -46.0 | -44.0 | -37.9 | 30.2 | 20.2 | 9.6 | 0.20 |
| 940308 | 0700 | 0.54 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -40.0 | -33.9 | 28.0 | 20.9 | 21.1 | 0.18 |
| 940308 | 1000 | 0.53 | 0.152 | 0.152 | 6.59 | 6.59 | -40.0 | -40.0 | -33.7 | 28.1 | 19.2 | 15.4 | 0.17 |
| 940308 | 1300 | 0.51 | 0.142 | 0.142 | 7.04 | 7.04 | -40.0 | -42.0 | -35.7 | 25.3 | 15.8 | 11.0 | 0.20 |
| 940308 | 1600 | 0.52 | 0.152 | 0.152 | 6.59 | 6.59 | -40.0 | -40.0 | -37.0 | 22.7 | 14.6 | 8.6 | 0.18 |
| 940308 | 1900 | 0.47 | 0.142 | 0.152 | 7.04 | 6.59 | -38.0 | -40.0 | -37.7 | 20.5 | 15.2 | 12.8 | 0.19 |
| 940308 | 2200 | 0.96 | 0.210 | 0.210 | 4.75 | 4.75 | 50.0 | 52.0 | 38.1 | 25.2 | 18.1 | 11.9 | 0.18 |
| 940309 | 0100 | 1.30 | 0.191 | 0.181 | 5.24 | 5.52 | 34.0 | 32.0 | 31.3 | 26.9 | 24.9 | 18.2 | 0.15 |
| 940309 | 0400 | 1.43 | 0.171 | 0.181 | 5.83 | 5.52 | 22.0 | 18.0 | 28.5 | 35.5 | 32.0 | 24.5 | 0.12 |
| 940309 | 0700 | 1.46 | 0.162 | 0.152 | 6.19 | 6.59 | 18.0 | 10.0 | 30.6 | 35.4 | 27.9 | 22.7 | 0.17 |
| 940309 | 1000 | 1.30 | 0.152 | 0.152 | 6.59 | 6.59 | 12.0 | 10.0 | 24.5 | 29.4 | 26.1 | 12.5 | 0.12 |
| 940309 | 1300 | 1.28 | 0.152 | 0.152 | 6.59 | 6.59 | 20.0 | 12.0 | 24.7 | 28.3 | 25.9 | 16.6 | 0.12 |
| 940309 | 1600 | 1.36 | 0.152 | 0.152 | 6.59 | 6.59 | 16.0 | 18.0 | 20.4 | 30.6 | 25.8 | 19.5 | 0.14 |
| 940309 | 1900 | 1.23 | 0.142 | 0.142 | 7.04 | 7.04 | 22.0 | 16.0 | 20.7 | 30.7 | 26.9 | 20.8 | 0.14 |
| 940309 | 2200 | 1.18 | 0.142 | 0.142 | 7.04 | 7.04 | 16.0 | 16.0 | 20.1 | 33.9 | 34.5 | 27.6 | 0.10 |
| 940310 | 0100 | 1.24 | 0.142 | 0.142 | 7.04 | 7.04 | 14.0 | 12.0 | 8.3 | 49.7 | 49.8 | 49.1 | 0.13 |
| 940310 | 0400 | 1.22 | 0.142 | 0.142 | 7.04 | 7.04 | -38.0 | -38.0 | -27.0 | 49.0 | 43.7 | 45.9 | 0.15 |
| 940310 | 0700 | 1.22 | 0.123 | 0.132 | 8.16 | 7.56 | -42.0 | -42.0 | -38.9 | 46.5 | 38.6 | 43.7 | 0.14 |
| 940310 | 1000 | 1.13 | 0.132 | 0.123 | 7.56 | 8.16 | -38.0 | -38.0 | -38.3 | 24.3 | 24.0 | 21.5 | 0.14 |
| 940310 | 1300 | 1.02 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -38.0 | -40.6 | 27.0 | 24.5 | 18.9 | 0.18 |
| 940310 | 1600 | 1.12 | 0.123 | 0.123 | 8.16 | 8.16 | -40.0 | -40.0 | -38.1 | 27.1 | 25.8 | 25.7 | 0.15 |
| 940310 | 1900 | 1.33 | 0.210 | 0.123 | 4.75 | 8.16 | 50.0 | 58.0 | 18.6 | 76.8 | 24.7 | 26.4 | 0.20 |
| 940310 | 2200 | 1.72 | 0.191 | 0.181 | 5.24 | 5.52 | 38.0 | 42.0 | 30.7 | 23.4 | 17.2 | 13.2 | 0.21 |
| 940311 | 0100 | 1.81 | 0.171 | 0.171 | 5.83 | 5.83 | 40.0 | 52.0 | 35.5 | 26.3 | 20.2 | 17.3 | 0.24 |
| 940311 | 0400 | 1.90 | 0.162 | 0.162 | 6.19 | 6.19 | 38.0 | 36.0 | 36.8 | 24.7 | 19.5 | 15.2 | 0.21 |
| 940311 | 0700 | 1.63 | 0.162 | 0.162 | 6.19 | 6.19 | 40.0 | 38.0 | 35.1 | 26.5 | 16.5 | 15.8 | 0.20 |
| 940311 | 1000 | 1.43 | 0.142 | 0.152 | 7.04 | 6.59 | 22.0 | 36.0 | 32.2 | 25.4 | 16.2 | 15.1 | 0.19 |
| 940311 | 1300 | 1.25 | 0.152 | 0.142 | 6.59 | 7.04 | 28:0 | 26.0 | 33.2 | 24.3 | 16.3 | 13.4 | 0.17 |
| 940311 | 1600 | 1.28 | 0.142 | 0.142 | 7.04 | 7.04 | 20.0 | 52.0 | 34.5 | 29.3 | 17.3 | 11.9 | 0.21 |
| 940311 | 1900 | 1.23 | 0.152 | 0.152 | 6.59 | 6.59 | 26.0 | 24.0 | 28.7 | 26.4 | 17.1 | 8.8 | 0.20 |
| 940311 | 2200 | 1.00 | 0.132 | 0.123 | 7.56 | 8.16 | 16.0 | 16.0 | 24.2 | 32.0 | 19.6 | 16.7 | 0.17 |
| 940312 | 0100 | 1.01 | 0.132 | 0.132 | 7.56 | 7.56 | 16.0 | 16.0 | 20.9 | 29.5 | 20.9 | 13.4 | 0.14 |
| 940312 | 0400 | 1.14 | 0.142 | 0.142 | 7.04 | 7.04 | 16.0 | 12.0 | 22.2 | 32.6 | 24.9 | 14.0 | 0.17 |
| 940312 | 0700 | 1.23 | 0.142 | 0.103 | 7.04 | 9.71 | 16.0 | 18.0 | 23.3 | 29.8 | 22.9 | 29.1 | 0.17 |
| 940312 | 1000 | 1.15 | 0.152 | 0.103 | 6.59 | 9.71 | 16.0 | 10.0 | 20.8 | 26.7 | 23.1 | 23.4 | 0.13 |
| 940312 | 1300 | 1.07 | 0.113 | 0.103 | 8.87 | 9.71 | 6.0 | 8.0 | 13.1 | 24.8 | 20.5 | 21.5 | 0.10 |
| 940312 | 1600 | 1.10 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 8.0 | 16.0 | 27.2 | 23.1 | 19.6 | 0.13 |
| 940312 | 1900 | 1.02 | 0.103 | 0.103 | 9.71 | 9.71 | 6.0 | 4.0 | 14.4 | 27.2 | 24.0 | 26.0 | 0.17 |
| 940312 | 2200 | 0.95 | 0.103 | 0.103 | 9.71 | 9.71 | 6.0 | 6.0 | 11.9 | 24.8 | 23.3 | 21.2 | 0.16 |
| 940313 | 0100 | 0.90 | 0.093 | 0.103 | 10.72 | 9.71 | 2.0 | 4.0 | 8.4 | 26.3 | 24.8 | 25.3 | 0.11 |
| 940313 | 0400 | 0.88 | 0.103 | 0.103 | 9.71 | 9.71 | 2.0 | 2.0 | 4.3 | 26.7 | 25.9 | 21.5 | 0.13 |
| 940313 | 0700 | 0.86 | 0.103 | 0.093 | 9.71 | 10.72 | 0.0 | 2.0 | 6.8 | 26.3 | 27.2 | 20.8 | 0.21 |
| 940313 | 1000 | 0.82 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 2.0 | 6.8 | 26.4 | 27.8 | 20.5 | 0.17 |
| 940313 | 1300 | 0.84 | 0.093 | 0.103 | 10.72 | 9.71 | 2.0 | 2.0 | 4.2 | 25.9 | 27.1 | 22.7 | 0.13 |
| 940313 | 1600 | 0.94 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | 2.0 | 2.5 | 23.7 | 24.7 | 20.2 | 0.15 |
| 940313 | 1900 | 0.93 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | -4.0 | -0.7 | 24.2 | 24.6 | 22.8 | 0.24 |
| 940313 | 2200 | 0.85 | 0.083 | 0.083 | 11.98 | 11.98 | 2.0 | 2.0 | 0.3 | 24.8 | 25.3 | 21.2 | 0.22 |
| 940314 | 0100 | 0.80 | 0.093 | 0.093 | 10.72 | 10.72 | 4.0 | 4.0 | -2.0 | 27.1 | 26.0 | 21.6 | 0.14 |
| 940314 | 0400 | 0.76 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 4.0 | -4.8 | 29.9 | 28.3 | 24.2 | 0.15 |
| 940314 | 0700 | 0.75 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | -2.0 | -13.7 | 33.4 | 28.3 | 23.8 | 0.22 |
| 940314 | 1000 | 0.68 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | -4.0 | -13.3 | 34.0 | 29.3 | 24.2 | 0.21 |
| 940314 | 1300 | 1.09 | 0.250 | 0.269 | 4.01 | 3.72 | 54.0 | 54.0 | 33.3 | 47.2 | 16.7 | 8.9 | 0.36 |
| 940314 | 1600 | 0.92 | 0.220 | 0.220 | 4.54 | 4.54 | 56.0 | 54.0 | 31.5 | 54.5 | 19.3 | 7.8 | 0.23 |
| 940314 | 1900 | 0.68 | 0.093 | 0.103 | 10.72 | 9.71 | -2.0 | 58.0 | 15.8 | 56.7 | 27.5 | 26.2 | 0.25 |
| 940314 | 2200 | 0.67 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | 2.0 | 10.4 | 30.5 | 25.2 | 24.1 | 0.20 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940315 | 0100 | 0.71 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | 4.0 | 9.8 | 28.5 | 22.5 | 25.5 | 0.13 |
| 940315 | 0400 | 0.76 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 2.0 | 8.1 | 27.1 | 23.1 | 22.3 | 0.12 |
| 940315 | 0700 | 0.78 | 0.113 | 0.113 | 8.87 | 8.87 | 0.0 | 2.0 | 6.0 | 27.8 | 25.7 | 14.5 | 0.16 |
| 940315 | 1000 | 0.72 | 0.113 | 0.113 | 8.87 | 8.87 | 4.0 | 6.0 | 0.9 | 28.9 | 29.1 | 27.5 | 0.20 |
| 940315 | 1300 | 0.69 | 0.123 | 0.123 | 8.16 | 8.16 | 4.0 | 4.0 | 1.4 | 25.7 | 26.7 | 18.5 | 0.16 |
| 940315 | 1600 | 0.66 | 0.093 | 0.103 | 10.72 | 9.71 | -6.0 | 4.0 | -3.6 | 27.2 | 25.4 | 22.5 | 0.16 |
| 940315 | 1900 | 0.60 | 0.093 | 0.093 | 10.72 | 10.72 | -4.0 | 2.0 | -6.9 | 26.9 | 27.0 | 23.6 | 0.23 |
| 940315 | 2200 | 0.59 | 0.083 | 0.093 | 11.98 | 10.72 | 6.0 | -10.0 | -3.2 | 27.0 | 27.4 | 27.8 | 0.25 |
| 940316 | 0100 | 0.57 | 0.083 | 0.093 | 11.98 | 10.72 | 4.0 | 4.0 | -2.7 | 27.0 | 27.1 | 25.4 | 0.23 |
| 940316 | 0400 | 0.56 | 0.103 | 0.103 | 9.71 | 9.71 | 2.0 | 4.0 | -6.5 | 32.2 | 29.0 | 22.2 | 0.22 |
| 940316 | 0700 | 0.72 | 0.289 | 0.093 | 3.47 | 10.72 | 64.0 | 6.0 | 11.1 | 48.2 | 25.8 | 25.1 | 0.32 |
| 940316 | 1000 | 0.96 | 0.250 | 0.240 | 4.01 | 4.17 | 56.0 | 56.0 | 34.8 | 49.6 | 20.0 | 15.3 | 0.31 |
| 940316 | 1300 | 0.81 | 0.240 | 0.093 | 4.17 | 10.72 | 52.0 | 52.0 | 27.6 | 50.7 | 20.1 | 22.9 | 0.22 |
| 940316 | 1600 | 0.82 | 0.093 | 0.093 | 10.72 | 10.72 | -2.0 | 50.0 | 26.2 | 46.9 | 25.0 | 20.4 | 0.15 |
| 940316 | 1900 | 0.97 | 0.201 | 0.201 | 4.98 | 4.98 | 46.0 | 46.0 | 32.7 | 36.4 | 21.1 | 15.9 | 0.16 |
| 940316 | 2200 | 1.68 | 0.162 | 0.162 | 6.19 | 6.19 | 42.0 | 42.0 | 38.0 | 17.0 | 14.9 | 10.4 | 0.19 |
| 940317 | 0100 | 1.38 | 0.162 | 0.152 | 6.19 | 6.59 | 40.0 | 40.0 | 31.8 | 18.5 | 13.6 | 11.9 | 0.16 |
| 940317 | 0400 | 1.25 | 0.152 | 0.142 | 6.59 | 7.04 | 34.0 | 34.0 | 28.0 | 18.3 | 11.7 | 11.9 | 0.17 |
| 940317 | 0700 | 1.06 | 0.152 | 0.152 | 6.59 | 6.59 | 32.0 | 42.0 | 31.5 | 20.0 | 11.2 | 8.3 | 0.20 |
| 940317 | 1000 | 1.03 | 0.142 | 0.142 | 7.04 | 7.04 | 30.0 | 42.0 | 35.7 | 15.9 | 10.2 | 8.0 | 0.19 |
| 940317 | 1300 | 0.77 | 0.171 | 0.152 | 5.83 | 6.59 | 38.0 | 38.0 | 29.8 | 17.0 | 11.7 | 9.7 | 0.17 |
| 940317 | 1600 | 0.71 | 0.152 | 0.152 | 6.59 | 6.59 | 24.0 | 26.0 | 24.8 | 20.9 | 12.3 | 8.0 | 0.15 |
| 940317 | 1900 | 0.64 | 0.162 | 0.162 | 6.19 | 6.19 | 30.0 | 30.0 | 21.5 | 22.7 | 14.7 | 9.0 | 0.18 |
| 940317 | 2200 | 0.58 | 0.132 | 0.132 | 7.56 | 7.56 | 14.0 | 14.0 | 21.5 | 25.8 | 17.2 | 9.4 | 0.18 |
| 940318 | 0100 | 0.48 | 0.123 | 0.123 | 8.16 | 8.16 | 12.0 | 12.0 | 18.2 | 27.3 | 21.5 | 8.7 | 0.24 |
| 940318 | 0400 | 0.45 | 0.142 | 0.142 | 7.04 | 7.04 | 14.0 | 14.0 | 12.6 | 26.2 | 26.7 | 12.1 | 0.18 |
| 940318 | 0700 | 0.47 | 0.152 | 0.083 | 6.59 | 11.98 | 26.0 | 14.0 | 8.7 | 31.4 | 29.0 | 27.5 | 0.21 |
| 940318 | 1000 | 0.49 | 0.318 | 0.083 | 3.15 | 11.98 | -56.0 | -56.0 | -12.8 | 60.5 | 21.7 | 24.4 | 0.23 |
| 940318 | 1300 | 0.43 | 0.152 | 0.152 | 6.59 | 6.59 | 16.0 | 16.0 | -12.7 | 54.8 | 24.4 | 7.9 | 0.20 |
| 940318 | 1600 | 0.35 | 0.152 | 0.152 | 6.59 | 6.59 | 14.0 | 14.0 | -17.6 | 50.7 | 36.8 | 40.6 | 0.20 |
| 940318 | 1900 | 0.42 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -40.0 | -33.6 | 35.8 | 32.2 | 18.7 | 0.20 |
| 940318 | 2200 | 0.45 | 0.123 | 0.123 | 8.16 | 8.16 | -42.0 | -40.0 | -17.0 | 38.7 | 31.7 | 19.8 | 0.19 |
| 940319 | 0100 | 0.47 | 0.123 | 0.123 | 8.16 | 8.16 | -40.0 | -38.0 | -26.1 | 29.4 | 20.8 | 16.9 | 0.22 |
| 940319 | 0400 | 0.70 | 0.289 | 0.289 | 3.47 | 3.47 | 56.0 | 56.0 | 32.6 | 36.8 | 15.2 | 10.7 | 0.37 |
| 940319 | 0700 | 1.60 | 0.171 | 0.171 | 5.83 | 5.83 | 38.0 | 46.0 | 42.2 | 12.0 | 11.5 | 6.4 | 0.23 |
| 940319 | 1000 | 1.40 | 0.152 | 0.162 | 6.59 | 6.19 | 30.0 | 36.0 | 40.3 | 15.0 | 12.9 | 9.4 | 0.23 |
| 940319 | 1300 | 0.94 | 0.152 | 0.152 | 6.59 | 6.59 | 30.0 | 34.0 | 33.8 | 18.8 | 14.1 | 9.6 | 0.17 |
| 940319 | 1600 | 0.80 | 0.152 | 0.152 | 6.59 | 6.59 | 22.0 | 24.0 | 25.1 | 23.8 | 17.4 | 9.4 | 0.13 |
| 940319 | 1900 | 0.67 | 0.162 | 0.123 | 6.19 | 8.16 | 24.0 | 22.0 | 18.2 | 33.6 | 22.4 | 31.7 | 0.14 |
| 940319 | 2200 | 0.60 | 0.132 | 0.123 | 7.56 | 8.16 | 14.0 | 16.0 | 13.4 | 38.1 | 24.6 | 28.7 | 0.19 |
| 940320 | 0100 | 0.46 | 0.132 | 0.132 | 7.56 | 7.56 | 12.0 | 14.0 | 9.1 | 45.3 | 34.4 | 23.8 | 0.21 |
| 940320 | 0400 | 0.42 | 0.142 | 0.142 | 7.04 | 7.04 | 12.0 | 12.0 | 4.2 | 42.2 | 30.4 | 12.2 | 0.18 |
| 940320 | 0700 | 0.39 | 0.162 | 0.103 | 6.19 | 9.71 | 18.0 | 18.0 | 5.6 | 42.0 | 29.8 | 23.4 | 0.15 |
| 940320 | 1000 | 0.38 | 0.171 | 0.123 | 5.83 | 8.16 | 16.0 | 16.0 | 0.9 | 41.6 | 31.3 | 27.0 | 0.17 |
| 940320 | 1300 | 0.41 | 0.123 | 0.123 | 8.16 | 8.16 | -6.0 | 16.0 | 4.6 | 37.8 | 30.1 | 23.4 | 0.17 |
| 940320 | 1600 | 0.43 | 0.123 | 0.123 | 8.16 | 8.16 | -16.0 | 18.0 | -1.7 | 36.6 | 27.3 | 21.6 | 0.15 |
| 940320 | 1900 | 0.39 | 0.123 | 0.123 | 8.16 | 8.16 | -6.0 | 4.0 | -0.9 | 38.6 | 28.9 | 25.4 | 0.16 |
| 940320 | 2200 | 0.35 | 0.142 | 0.132 | 7.04 | 7.56 | -12.0 | -16.0 | -4.9 | 40.3 | 33.6 | 27.8 | 0.16 |
| 940321 | 0100 | 0.32 | 0.220 | 0.123 | 4.54 | 8.16 | 28.0 | -14.0 | 1.8 | 47.6 | 34.2 | 24.1 | 0.19 |
| 940321 | 0400 | 0.32 | 0.113 | 0.123 | 8.87 | 8.16 | -12.0 | -12.0 | 1.6 | 42.5 | 37.6 | 24.1 | 0.17 |
| 940321 | 0700 | 0.37 | 0.113 | 0.123 | 8.87 | 8.16 | -2.0 | -16.0 | 2.1 | 35.8 | 32.3 | 23.2 | 0.16 |
| 940321 | 1000 | 0.43 | 0.123 | 0.123 | 8.16 | 8.16 | -2.0 | -2.0 | 2.7 | 35.7 | 35.8 | 20.4 | 0.14 |
| 940321 | 1300 | 0.48 | 0.152 | 0.132 | 6.59 | 7.56 | -16.0 | -16.0 | -8.5 | 35.2 | 37.9 | 27.9 | 0.14 |
| 940321 | 1600 | 0.51 | 0.132 | 0.142 | 7.56 | 7.04 | -10.0 | -10.0 | -5.9 | 31.5 | 35.6 | 21.5 | 0.14 |
| 940321 | 1900 | 0.63 | 0.289 | 0.259 | 3.47 | 3.86 | -62.0 | -62.0 | -41.5 | 47.7 | 22.7 | 16.3 | 0.23 |
| 940321 | 2200 | 0.62 | 0.308 | 0.308 | 3.25 | 3.25 | -60.0 | -58.0 | -39.5 | 41.0 | 21.4 | 6.9 | 0.26 |
| 940322 | 0100 | 0.78 | 0.132 | 0.132 | 7.56 | 7.56 | -42.0 | -42.0 | -42.7 | 32.5 | 31.1 | 32.1 | 0.17 |
| 940322 | 0400 | 0.75 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -42.0 | -32.1 | 30.6 | 31.0 | 30.0 | 0.15 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940322 | 0700 | 0.79 | 0.308 | 0.132 | 3.25 | 7.56 | 60.0 | 58.0 | 2.3 | 82.2 | 21.9 | 22.6 | 0.23 |
| 940322 | 1000 | 0.85 | 0.279 | 0.279 | 3.59 | 3.59 | 58.0 | 58.0 | 22.6 | 79.2 | 22.6 | 17.5 | 0.27 |
| 940322 | 1300 | 0.80 | 0.240 | 0.240 | 4.17 | 4.17 | 56.0 | 56.0 | 30.8 | 53.4 | 23.5 | 10.5 | 0.22 |
| 940322 | 1600 | 0.65 | 0.201 | 0.210 | 4.98 | 4.75 | 48.0 | 50.0 | 36.1 | 48.1 | 21.5 | 11.1 | 0.21 |
| 940322 | 1900 | 0.57 | 0.191 | 0.191 | 5.24 | 5.24 | 46.0 | 46.0 | 26.6 | 43.4 | 23.7 | 17.4 | 0.14 |
| 940322 | 2200 | 0.51 | 0.191 | 0.191 | 5.24 | 5.24 | 42.0 | 40.0 | 21.2 | 44.9 | 26.0 | 15.5 | 0.14 |
| 940323 | 0100 | 0.45 | 0.191 | 0.123 | 5.24 | 8.16 | 38.0 | 38.0 | 4.2 | 49.8 | 32.2 | 30.9 | 0.19 |
| 940323 | 0400 | 0.40 | 0.113 | 0.123 | 8.87 | 8.16 | -8.0 | -8.0 | -1.4 | 40.3 | 35.3 | 30.3 | 0.22 |
| 940323 | 0700 | 0.34 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -2.0 | -0.6 | 36.3 | 38.2 | 18.4 | 0.24 |
| 940323 | 1000 | 0.33 | 0.103 | 0.113 | 9.71 | 8.87 | 2.0 | 4.0 | -0.4 | 31.7 | 34.3 | 22.0 | 0.21 |
| 940323 | 1300 | 0.34 | 0.103 | 0.113 | 9.71 | 8.87 | -12.0 | -10.0 | -10.7 | 24.4 | 28.1 | 15.8 | 0.20 |
| 940323 | 1600 | 0.35 | 0.113 | 0.113 | 8.87 | 8.87 | -2.0 | -50.0 | -22.7 | 41.9 | 22.4 | 16.8 | 0.23 |
| 940323 | 1900 | 0.25 | 0.113 | 0.113 | 8.87 | 8.87 | -6.0 | -8.0 | -22.3 | 36.8 | 28.7 | 20.3 | 0.24 |
| 940323 | 2200 | 0.21 | 0.064 | 0.074 | 15.63 | 13.56 | -10.0 | -12.0 | -21.9 | 33.3 | 28.0 | 25.2 | 0.27 |
| 940324 | 0100 | 0.20 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | -36.0 | -22.5 | 36.6 | 28.6 | 23.3 | 0.35 |
| 940324 | 0400 | 0.21 | 0.181 | 0.074 | 5.52 | 13.56 | -50.0 | -34.0 | -27.1 | 37.5 | 28.4 | 33.7 | 0.30 |
| 940324 | 0700 | 0.24 | 0.191 | 0.083 | 5.24 | 11.98 | -30.0 | -32.0 | -19.8 | 35.7 | 25.5 | 32.8 | 0.31 |
| 940324 | 1000 | 0.25 | 0.103 | 0.093 | 9.71 | 10.72 | 0.0 | -30.0 | -17.0 | 34.4 | 23.8 | 26.2 | 0.29 |
| 940324 | 1300 | 0.27 | 0.308 | 0.103 | 3.25 | 9.71 | -54.0 | -54.0 | -26.9 | 46.5 | 26.5 | 29.5 | 0.34 |
| 940324 | 1600 | 0.36 | 0.279 | 0.279 | 3.59 | 3.59 | -58.0 | -58.0 | -42.0 | 37.6 | 13.9 | 4.5 | 0.36 |
| 940324 | 1900 | 0.30 | 0.289 | 0.064 | 3.47 | 15.63 | -58.0 | -58.0 | -33.1 | 51.2 | 21.1 | 21.0 | 0.33 |
| 940324 | 2200 | 0.31 | 0.171 | 0.064 | 5.83 | 15.63 | -46.0 | -46.0 | -26.2 | 46.3 | 23.0 | 23.8 | 0.30 |
| 940325 | 0100 | 0.39 | 0.162 | 0.162 | 6.19 | 6.19 | -46.0 | -46.0 | -32.1 | 38.2 | 22.0 | 10.2 | 0.23 |
| 940325 | 0400 | 0.48 | 0.152 | 0.162 | 6.59 | 6.19 | -46.0 | -46.0 | -40.1 | 27.3 | 19.5 | 13.3 | 0.19 |
| 940325 | 0700 | 0.47 | 0.171 | 0.171 | 5.83 | 5.83 | -50.0 | -50.0 | -36.2 | 33.2 | 17.9 | 8.5 | 0.22 |
| 940325 | 1000 | 0.50 | 0.152 | 0.142 | 6.59 | 7.04 | -44.0 | -44.0 | -34.6 | 32.6 | 16.1 | 10.8 | 0.22 |
| 940325 | 1300 | 0.76 | 0.142 | 0.142 | 7.04 | 7.04 | -42.0 | 90.0 | 28.3 | 116.1 | 24.4 | 10.4 | 0.25 |
| 940325 | 1600 | 1.12 | 0.210 | 0.210 | 4.75 | 4.75 | 38.0 | 38.0 | 38.4 | 38.3 | 27.0 | 21.8 | 0.19 |
| 940325 | 1900 | 0.93 | 0.230 | 0.230 | 4.35 | 4.35 | 56.0 | 58.0 | 29.2 | 50.4 | 27.4 | 22.8 | 0.26 |
| 940325 | 2200 | 0.77 | 0.230 | 0.210 | 4.35 | 4.75 | 46.0 | 52.0 | 21.3 | 53.5 | 27.3 | 17.8 | 0.21 |
| 940326 | 0100 | 1.26 | 0.210 | 0.210 | 4.75 | 4.75 | 50.0 | 52.0 | 40.7 | 26.2 | 19.4 | 12.0 | 0.23 |
| 940326 | 0400 | 1.46 | 0.191 | 0.191 | 5.24 | 5.24 | 46.0 | 46.0 | 42.7 | 21.7 | 19.1 | 13.1 | 0.22 |
| 940326 | 0700 | 1.43 | 0.162 | 0.162 | 6.19 | 6.19 | 24.0 | 16.0 | 32.8 | 28.8 | 22.3 | 15.6 | 0.17 |
| 940326 | 1000 | 1.26 | 0.162 | 0.162 | 6.19 | 6.19 | 26.0 | 28.0 | 28.8 | 28.3 | 22.4 | 15.7 | 0.14 |
| 940326 | 1300 | 1.19 | 0.142 | 0.142 | 7.04 | 7.04 | 18.0 | 20.0 | 20.5 | 29.1 | 21.2 | 20.5 | 0.12 |
| 940326 | 1600 | 1.08 | 0.132 | 0.142 | 7.56 | 7.04 | 14.0 | 24.0 | 20.4 | 28.9 | 23.5 | 19.7 | 0.17 |
| 940326 | 1900 | 0.87 | 0.162 | 0.132 | 6.19 | 7.56 | 30.0 | 18.0 | 16.2 | 30.7 | 25.4 | 29.5 | 0.18 |
| 940326 | 2200 | 0.78 | 0.113 | 0.113 | 8.87 | 8.87 | 6.0 | 10.0 | 13.3 | 28.4 | 23.5 | 18.2 | 0.12 |
| 940327 | 0100 | 0.83 | 0.103 | 0.123 | 9.71 | 8.16 | 0.0 | 2.0 | 8.6 | 30.4 | 26.6 | 21.4 | 0.13 |
| 940327 | 0400 | 0.92 | 0.113 | 0.142 | 8.87 | 7.04 | -2.0 | 2.0 | 4.7 | 35.0 | 31.8 | 35.0 | 0.14 |
| 940327 | 0700 | 0.76 | 0.123 | 0.123 | 8.16 | 8.16 | 0.0 | -2.0 | 5.9 | 39.3 | 36.9 | 25.4 | 0.16 |
| 940327 | 1000 | 0.92 | 0.279 | 0.259 | 3.59 | 3.86 | -66.0 | -62.0 | -43.2 | 50.8 | 28.6 | 23.0 | 0.23 |
| 940327 | 1300 | 1.13 | 0.162 | 0.152 | 6.19 | 6.59 | -40.0 | -38.0 | -39.8 | 25.7 | 18.8 | 18.9 | 0.21 |
| 940327 | 1600 | 1.06 | 0.132 | 0.132 | 7.56 | 7.56 | -38.0 | -38.0 | -36.2 | 29.6 | 27.2 | 24.7 | 0.16 |
| 940327 | 1900 | 0.84 | 0.123 | 0.132 | 8.16 | 7.56 | -40.0 | -40.0 | -36.5 | 31.8 | 29.1 | 27.8 | 0.18 |
| 940327 | 2200 | 0.77 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -40.0 | -35.2 | 31.0 | 23.3 | 24.3 | 0.15 |
| 940328 | 0100 | 0.78 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -38.0 | -40.0 | 27.0 | 20.5 | 25.8 | 0.17 |
| 940328 | 0400 | 0.70 | 0.132 | 0.123 | 7.56 | 8.16 | -38.0 | -40.0 | -40.2 | 25.1 | 21.1 | 26.5 | 0.17 |
| 940328 | 0700 | 0.69 | 0.142 | 0.132 | 7.04 | 7.56 | -40.0 | -50.0 | -41.5 | 27.3 | 18.2 | 25.3 | 0.19 |
| 940328 | 1000 | 0.63 | 0.132 | 0.123 | 7.56 | 8.16 | -38.0 | -40.0 | -42.9 | 27.9 | 15.2 | 25.1 | 0.17 |
| 940328 | 1300 | 0.64 | 0.142 | 0.132 | 7.04 | 7.56 | -40.0 | -40.0 | -45.0 | 28.9 | 13.7 | 23.9 | 0.15 |
| 940328 | 1600 | 0.63 | 0.152 | 0.142 | 6.59 | 7.04 | -42.0 | -42.0 | -44.9 | 27.4 | 25.2 | 16.0 | 0.15 |
| 940328 | 1900 | 0.59 | 0.142 | 0.132 | 7.04 | 7.56 | -44.0 | -44.0 | -41.6 | 27.8 | 24.3 | 18.8 | 0.22 |
| 940328 | 2200 | 0.53 | 0.132 | 0.132 | 7.56 | 7.56 | -42.0 | -42.0 | -42.3 | 31.0 | 27.3 | 23.6 | 0.21 |
| 940329 | 0100 | 0.50 | 0.113 | 0.113 | 8.87 | 8.87 | -40.0 | -40.0 | -42.1 | 33.0 | 29.2 | 25.1 | 0.14 |
| 940329 | 1000 | 0.46 | 0.123 | 0.123 | 8.16 | 8.16 | -40.0 | -40.0 | -38.1 | 32.2 | 28.7 | 18.8 | 0.26 |
| 940329 | 1300 | 0.56 | 0.318 | 0.103 | 3.15 | 9.71 | 42.0 | 42.0 | -2.5 | 73.2 | 26.0 | 30.3 | 0.27 |
| 940329 | 1600 | 0.77 | 0.191 | 0.113 | 5.24 | 8.87 | 44.0 | 44.0 | 15.2 | 57.4 | 18.7 | 22.3 | 0.18 |

*(Sheet 26 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940329 | 1900 | 0.64 | 0.201 | 0.103 | 4.98 | 9.71 | 44.0 | 42.0 | 3.0 | 68.3 | 21.4 | 22.9 | 0.24 |
| 940329 | 2200 | 0.57 | 0.103 | 0.103 | 9.71 | 9.71 | -24.0 | -24.0 | -18.0 | 34.6 | 21.5 | 14.9 | 0.34 |
| 940330 | 0100 | 0.48 | 0.103 | 0.103 | 9.71 | 9.71 | -26.0 | -28.0 | -5.8 | 52.6 | 23.8 | 23.3 | 0.21 |
| 940330 | 0400 | 0.52 | 0.103 | 0.103 | 9.71 | 9.71 | -30.0 | 40.0 | 3.8 | 51.1 | 25.9 | 29.3 | 0.15 |
| 940330 | 0700 | 0.60 | 0.181 | 0.181 | 5.52 | 5.52 | 26.0 | 40.0 | 10.7 | 43.9 | 23.1 | 14.6 | 0.18 |
| 940330 | 1000 | 0.58 | 0.210 | 0.123 | 4.75 | 8.16 | 38.0 | 40.0 | 16.9 | 40.9 | 24.8 | 33.1 | 0.19 |
| 940330 | 1300 | 0.63 | 0.171 | 0.162 | 5.83 | 6.19 | 24.0 | 24.0 | 19.1 | 35.7 | 21.8 | 14.2 | 0.11 |
| 940330 | 1600 | 0.67 | 0.162 | 0.142 | 6.19 | 7.04 | 18.0 | 16.0 | 14.1 | 33.5 | 25.1 | 23.5 | 0.10 |
| 940330 | 1900 | 0.66 | 0.152 | 0.152 | 6.59 | 6.59 | 14.0 | 16.0 | 12.8 | 32.3 | 28.5 | 19.9 | 0.14 |
| 940330 | 2200 | 0.55 | 0.123 | 0.123 | 8.16 | 8.16 | -6.0 | 18.0 | 10.7 | 35.7 | 31.9 | 20.3 | 0.18 |
| 940331 | 0100 | 0.51 | 0.132 | 0.123 | 7.56 | 8.16 | -6.0 | -4.0 | 6.1 | 30.3 | 26.1 | 22.2 | 0.14 |
| 940331 | 0400 | 0.47 | 0.132 | 0.132 | 7.56 | 7.56 | 0.0 | 0.0 | 3.4 | 28.1 | 26.4 | 18.3 | 0.11 |
| 940331 | 0700 | 0.47 | 0.142 | 0.142 | 7.04 | 7.04 | -2.0 | 0.0 | 5.2 | 32.1 | 31.6 | 22.2 | 0.15 |
| 940331 | 1000 | 0.47 | 0.132 | 0.132 | 7.56 | 7.56 | 8.0 | 8.0 | 3.4 | 38.5 | 39.6 | 26.9 | 0.17 |
| 940331 | 1300 | 0.52 | 0.132 | 0.132 | 7.56 | 7.56 | 6.0 | -38.0 | -10.8 | 41.3 | 30.7 | 20.7 | 0.15 |
| 940331 | 1600 | 0.85 | 0.142 | 0.142 | 7.04 | 7.04 | -38.0 | -38.0 | -21.5 | 30.9 | 31.7 | 36.8 | 0.12 |
| 940331 | 1900 | 1.23 | 0.142 | 0.142 | 7.04 | 7.04 | -10.0 | -14.0 | -15.2 | 29.8 | 30.4 | 24.2 | 0.14 |
| 940331 | 2200 | 1.14 | 0.132 | 0.132 | 7.56 | 7.56 | -6.0 | -10.0 | -13.6 | 30.0 | 30.3 | 25.9 | 0.15 |
| 940401 | 0100 | 1.04 | 0.123 | 0.132 | 8.16 | 7.56 | -4.0 | -10.0 | -8.4 | 27.6 | 26.8 | 23.4 | 0.13 |
| 940401 | 0400 | 0.87 | 0.132 | 0.132 | 7.56 | 7.56 | -12.0 | -12.0 | -5.5 | 30.9 | 25.6 | 23.7 | 0.11 |
| 940401 | 0700 | 0.79 | 0.132 | 0.132 | 7.56 | 7.56 | -16.0 | -12.0 | 8.7 | 60.1 | 22.9 | 23.2 | 0.13 |
| 940401 | 1000 | 1.03 | 0.240 | 0.240 | 4.17 | 4.17 | 56.0 | 56.0 | 41.3 | 23.6 | 15.8 | 8.6 | 0.27 |
| 940401 | 1300 | 0.81 | 0.210 | 0.230 | 4.75 | 4.35 | 50.0 | 54.0 | 37.6 | 31.9 | 17.5 | 11.8 | 0.28 |
| 940401 | 1600 | 0.53 | 0.132 | 0.123 | 7.56 | 8.16 | 16.0 | 26.0 | 20.3 | 36.0 | 26.3 | 31.7 | 0.15 |
| 940401 | 1900 | 0.73 | 0.152 | 0.142 | 6.59 | 7.04 | 28.0 | 30.0 | 21.3 | 28.3 | 21.4 | 32.3 | 0.15 |
| 940401 | 2200 | 0.80 | 0.132 | 0.142 | 7.56 | 7.04 | 12.0 | 14.0 | 19.2 | 24.0 | 19.1 | 14.1 | 0.21 |
| 940402 | 0100 | 0.79 | 0.093 | 0.093 | 10.72 | 10.72 | 4.0 | 10.0 | 11.6 | 22.6 | 20.3 | 18.1 | 0.23 |
| 940402 | 0400 | 0.77 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 10.0 | 12.3 | 21.4 | 20.9 | 16.4 | 0.12 |
| 940402 | 0700 | 0.74 | 0.103 | 0.103 | 9.71 | 9.71 | 2.0 | 10.0 | 10.0 | 23.0 | 23.9 | 17.4 | 0.12 |
| 940402 | 1000 | 0.72 | 0.113 | 0.103 | 8.87 | 9.71 | 0.0 | 12.0 | 7.1 | 26.6 | 26.6 | 20.3 | 0.18 |
| 940402 | 1300 | 0.65 | 0.103 | 0.113 | 9.71 | 8.87 | 2.0 | 4.0 | 5.8 | 26.6 | 26.1 | 20.2 | 0.21 |
| 940402 | 1600 | 0.63 | 0.113 | 0.113 | 8.87 | 8.87 | 8.0 | 6.0 | 3.8 | 25.7 | 26.0 | 21.6 | 0.14 |
| 940402 | 1900 | 0.62 | 0.113 | 0.113 | 8.87 | 8.87 | 0.0 | 0.0 | 0.4 | 27.3 | 27.1 | 21.8 | 0.14 |
| 940402 | 2200 | 0.62 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 2.0 | -2.6 | 26.7 | 25.5 | 16.1 | 0.21 |
| 940403 | 0100 | 0.62 | 0.113 | 0.113 | 8.87 | 8.87 | 6.0 | 4.0 | -3.5 | 27.1 | 26.1 | 21.5 | 0.28 |
| 940403 | 0400 | 0.65 | 0.103 | 0.103 | 9.71 | 9.71 | 6.0 | 2.0 | -3.0 | 25.9 | 26.2 | 22.5 | 0.19 |
| 940403 | 0700 | 0.63 | 0.103 | 0.103 | 9.71 | 9.71 | -4.0 | -6.0 | -5.7 | 25.7 | 25.6 | 18.4 | 0.14 |
| 940403 | 1000 | 0.61 | 0.113 | 0.113 | 8.87 | 8.87 | -4.0 | -6.0 | -0.3 | 29.2 | 28.8 | 23.1 | 0.18 |
| 940403 | 1300 | 0.57 | 0.113 | 0.123 | 8.87 | 8.16 | -8.0 | -10.0 | -7.5 | 32.2 | 30.0 | 30.2 | 0.26 |
| 940403 | 1600 | 0.52 | 0.113 | 0.113 | 8.87 | 8.87 | 4.0 | -8.0 | -8.5 | 30.5 | 28.7 | 26.5 | 0.27 |
| 940403 | 1900 | 0.48 | 0.113 | 0.113 | 8.87 | 8.87 | -8.0 | -8.0 | -12.4 | 28.2 | 26.7 | 23.4 | 0.17 |
| 940403 | 2200 | 0.53 | 0.162 | 0.132 | 6.19 | 7.56 | -44.0 | -44.0 | -24.8 | 36.0 | 26.6 | 28.1 | 0.20 |
| 940404 | 0100 | 0.53 | 0.152 | 0.152 | 6.59 | 6.59 | -44.0 | -44.0 | -32.5 | 36.6 | 26.0 | 20.0 | 0.22 |
| 940404 | 0400 | 0.49 | 0.162 | 0.132 | 6.19 | 7.56 | -44.0 | -44.0 | -33.7 | 33.7 | 25.4 | 28.5 | 0.24 |
| 940404 | 0700 | 0.66 | 0.142 | 0.269 | 7.04 | 3.72 | -40.0 | -38.0 | 10.0 | 83.1 | 26.0 | 24.1 | 0.18 |
| 940404 | 1000 | 0.79 | 0.259 | 0.269 | 3.86 | 3.72 | 48.0 | 44.0 | 15.9 | 63.4 | 31.0 | 26.3 | 0.16 |
| 940404 | 1300 | 0.83 | 0.250 | 0.250 | 4.01 | 4.01 | 36.0 | 36.0 | 18.5 | 46.5 | 29.2 | 22.0 | 0.16 |
| 940404 | 1600 | 0.82 | 0.240 | 0.230 | 4.17 | 4.35 | 46.0 | 4.0 | 14.0 | 50.6 | 35.4 | 34.9 | 0.13 |
| 940404 | 1900 | 0.83 | 0.181 | 0.191 | 5.52 | 5.24 | 14.0 | 16.0 | 9.5 | 35.2 | 31.1 | 18.4 | 0.11 |
| 940404 | 2200 | 0.77 | 0.191 | 0.191 | 5.24 | 5.24 | 32.0 | 8.0 | 13.5 | 49.7 | 35.0 | 23.3 | 0.12 |
| 940405 | 0100 | 0.80 | 0.181 | 0.181 | 5.52 | 5.52 | 18.0 | 16.0 | 10.2 | 41.6 | 36.7 | 14.1 | 0.14 |
| 940405 | 0400 | 0.77 | 0.171 | 0.171 | 5.83 | 5.83 | 20.0 | 26.0 | 17.1 | 40.2 | 25.5 | 12.5 | 0.16 |
| 940405 | 0700 | 0.69 | 0.132 | 0.132 | 7.56 | 7.56 | -4.0 | -2.0 | 7.3 | 41.5 | 23.4 | 16.9 | 0.14 |
| 940405 | 1000 | 0.74 | 0.142 | 0.113 | 7.04 | 8.87 | -2.0 | -2.0 | 9.3 | 36.2 | 28.3 | 27.5 | 0.12 |
| 940405 | 1300 | 0.73 | 0.142 | 0.113 | 7.04 | 8.87 | -2.0 | 0.0 | 6.1 | 38.3 | 33.3 | 30.5 | 0.15 |
| 940405 | 1600 | 0.64 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | 4.0 | 6.0 | 37.6 | 36.6 | 25.3 | 0.16 |
| 940405 | 1900 | 0.57 | 0.113 | 0.113 | 8.87 | 8.87 | -20.0 | -16.0 | -6.2 | 35.6 | 35.8 | 24.6 | 0.15 |
| 940405 | 2200 | 0.57 | 0.123 | 0.113 | 8.16 | 8.87 | -32.0 | -14.0 | -5.4 | 34.1 | 34.8 | 31.4 | 0.15 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,JFS}$ Hz | $T_{p,FD}$ sec | $T_{p,JFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,JDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{JDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940406 | 0100 | 0.56 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -16.0 | -16.3 | 32.8 | 33.2 | 24.0 | 0.25 |
| 940406 | 0400 | 0.55 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -14.0 | -13.7 | 30.2 | 30.3 | 20.7 | 0.25 |
| 940406 | 0700 | 0.56 | 0.113 | 0.113 | 8.87 | 8.87 | -14.0 | -12.0 | -25.6 | 36.2 | 29.7 | 25.4 | 0.21 |
| 940406 | 1000 | 0.67 | 0.171 | 0.113 | 5.83 | 8.87 | -42.0 | -42.0 | -30.6 | 31.9 | 21.9 | 22.8 | 0.15 |
| 940406 | 1300 | 0.73 | 0.191 | 0.113 | 5.24 | 8.87 | -48.0 | -38.0 | -31.5 | 31.0 | 21.2 | 30.0 | 0.21 |
| 940406 | 1600 | 0.87 | 0.289 | 0.113 | 3.47 | 8.87 | -56.0 | -54.0 | -39.9 | 32.2 | 15.6 | 27.0 | 0.28 |
| 940406 | 1900 | 0.65 | 0.113 | 0.103 | 8.87 | 9.71 | -12.0 | -56.0 | -33.0 | 38.1 | 18.0 | 27.1 | 0.27 |
| 940406 | 2200 | 0.60 | 0.142 | 0.113 | 7.04 | 8.87 | -38.0 | -38.0 | -25.9 | 33.7 | 22.3 | 27.5 | 0.17 |
| 940407 | 0100 | 0.65 | 0.142 | 0.113 | 7.04 | 8.87 | -38.0 | -38.0 | -29.7 | 31.0 | 23.7 | 21.9 | 0.22 |
| 940407 | 0400 | 0.68 | 0.132 | 0.103 | 7.56 | 9.71 | -38.0 | -38.0 | -30.4 | 29.3 | 23.7 | 20.5 | 0.24 |
| 940407 | 0700 | 0.63 | 0.132 | 0.103 | 7.56 | 9.71 | -38.0 | -38.0 | -30.3 | 27.9 | 23.0 | 20.9 | 0.28 |
| 940407 | 1000 | 0.57 | 0.152 | 0.103 | 6.59 | 9.71 | -36.0 | -38.0 | -27.9 | 31.1 | 25.9 | 27.0 | 0.18 |
| 940407 | 1300 | 0.55 | 0.103 | 0.103 | 9.71 | 9.71 | -10.0 | -38.0 | -27.3 | 32.0 | 25.5 | 22.8 | 0.23 |
| 940407 | 1600 | 1.06 | 0.201 | 0.210 | 4.98 | 4.75 | 40.0 | 40.0 | 22.0 | 37.9 | 29.3 | 21.0 | 0.14 |
| 940407 | 1900 | 1.24 | 0.181 | 0.181 | 5.52 | 5.52 | 48.0 | 44.0 | 39.7 | 27.5 | 23.9 | 15.6 | 0.15 |
| 940407 | 2200 | 0.96 | 0.201 | 0.191 | 4.98 | 5.24 | 54.0 | 54.0 | 37.1 | 35.8 | 21.7 | 19.2 | 0.21 |
| 940408 | 0100 | 1.13 | 0.181 | 0.191 | 5.52 | 5.24 | 44.0 | 42.0 | 33.4 | 18.4 | 16.3 | 12.3 | 0.22 |
| 940408 | 0400 | 1.05 | 0.171 | 0.171 | 5.83 | 5.83 | 40.0 | 40.0 | 33.2 | 16.1 | 14.7 | 12.3 | 0.20 |
| 940408 | 0700 | 0.99 | 0.171 | 0.171 | 5.83 | 5.83 | 36.0 | 38.0 | 29.9 | 18.9 | 15.2 | 7.9 | 0.12 |
| 940408 | 1000 | 0.81 | 0.181 | 0.181 | 5.52 | 5.52 | 38.0 | 38.0 | 28.7 | 28.8 | 19.3 | 11.2 | 0.10 |
| 940408 | 1300 | 0.90 | 0.171 | 0.171 | 5.83 | 5.83 | 32.0 | 32.0 | 28.1 | 28.3 | 21.9 | 16.6 | 0.12 |
| 940408 | 1600 | 1.00 | 0.162 | 0.162 | 6.19 | 6.19 | 30.0 | 26.0 | 26.0 | 25.7 | 22.5 | 13.0 | 0.14 |
| 940408 | 1900 | 0.83 | 0.162 | 0.162 | 6.19 | 6.19 | 32.0 | 36.0 | 25.8 | 30.8 | 22.0 | 12.2 | 0.13 |
| 940408 | 2200 | 0.73 | 0.152 | 0.152 | 6.59 | 6.59 | 28.0 | 34.0 | 19.9 | 33.9 | 25.1 | 16.7 | 0.11 |
| 940409 | 0100 | 0.66 | 0.162 | 0.162 | 6.19 | 6.19 | 18.0 | 18.0 | 12.0 | 35.4 | 28.3 | 18.7 | 0.11 |
| 940409 | 0400 | 0.65 | 0.181 | 0.171 | 5.52 | 5.83 | 36.0 | 18.0 | 11.3 | 37.1 | 32.5 | 26.9 | 0.15 |
| 940409 | 0700 | 0.63 | 0.162 | 0.113 | 6.19 | 8.87 | 18.0 | 20.0 | 8.5 | 38.9 | 34.3 | 28.8 | 0.16 |
| 940409 | 1000 | 0.56 | 0.171 | 0.113 | 5.83 | 8.87 | 20.0 | -10.0 | 7.0 | 35.6 | 31.9 | 24.9 | 0.13 |
| 940409 | 1300 | 0.56 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -16.0 | -13.8 | 36.4 | 36.5 | 21.5 | 0.16 |
| 940409 | 1600 | 0.62 | 0.308 | 0.113 | 3.25 | 8.87 | -56.0 | -56.0 | -27.9 | 42.6 | 28.3 | 29.2 | 0.26 |
| 940409 | 1900 | 0.58 | 0.103 | 0.103 | 9.71 | 9.71 | -24.0 | -24.0 | -20.8 | 33.8 | 29.3 | 23.6 | 0.24 |
| 940409 | 2200 | 0.55 | 0.113 | 0.113 | 8.87 | 8.87 | -8.0 | -12.0 | -24.0 | 31.0 | 27.6 | 23.5 | 0.18 |
| 940410 | 0100 | 0.61 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -12.0 | -22.4 | 26.8 | 23.9 | 18.3 | 0.17 |
| 940410 | 0400 | 0.65 | 0.103 | 0.103 | 9.71 | 9.71 | -12.0 | -12.0 | -27.0 | 29.4 | 23.0 | 17.0 | 0.23 |
| 940410 | 0700 | 0.68 | 0.103 | 0.103 | 9.71 | 9.71 | -14.0 | -48.0 | -32.2 | 31.1 | 21.9 | 17.7 | 0.26 |
| 940410 | 1000 | 0.62 | 0.103 | 0.103 | 9.71 | 9.71 | -10.0 | -12.0 | -25.4 | 29.6 | 19.9 | 22.8 | 0.20 |
| 940410 | 1300 | 0.64 | 0.103 | 0.113 | 9.71 | 8.87 | -22.0 | -44.0 | -29.9 | 30.3 | 17.0 | 19.8 | 0.19 |
| 940410 | 1600 | 0.70 | 0.181 | 0.113 | 5.52 | 8.87 | -40.0 | -40.0 | -30.5 | 28.9 | 15.4 | 18.8 | 0.25 |
| 940410 | 1900 | 0.68 | 0.171 | 0.103 | 5.83 | 9.71 | -44.0 | -42.0 | -36.9 | 23.0 | 16.7 | 21.8 | 0.29 |
| 940410 | 2200 | 0.60 | 0.103 | 0.103 | 9.71 | 9.71 | -16.0 | -40.0 | -29.2 | 24.9 | 17.0 | 19.2 | 0.26 |
| 940411 | 0100 | 0.56 | 0.123 | 0.103 | 8.16 | 9.71 | -20.0 | -36.0 | -26.2 | 22.4 | 18.6 | 19.7 | 0.18 |
| 940411 | 0400 | 0.61 | 0.142 | 0.113 | 7.04 | 8.87 | -38.0 | -28.0 | -30.4 | 21.3 | 22.2 | 16.8 | 0.23 |
| 940411 | 0700 | 1.12 | 0.210 | 0.210 | 4.75 | 4.75 | 28.0 | 24.0 | 12.6 | 48.2 | 28.6 | 23.0 | 0.11 |
| 940411 | 1000 | 1.36 | 0.201 | 0.201 | 4.98 | 4.98 | 36.0 | 34.0 | 21.3 | 37.8 | 33.0 | 28.1 | 0.09 |
| 940411 | 1300 | 1.35 | 0.181 | 0.191 | 5.52 | 5.24 | -2.0 | -2.0 | 9.5 | 39.8 | 33.6 | 34.8 | 0.09 |
| 940411 | 1600 | 1.35 | 0.162 | 0.162 | 6.19 | 6.19 | 8.0 | 6.0 | 9.4 | 31.7 | 31.7 | 15.7 | 0.11 |
| 940411 | 1900 | 1.24 | 0.162 | 0.171 | 6.19 | 5.83 | 12.0 | 14.0 | 24.4 | 41.8 | 35.2 | 20.1 | 0.15 |
| 940411 | 2200 | 1.29 | 0.181 | 0.181 | 5.52 | 5.52 | 18.0 | 18.0 | 20.8 | 35.2 | 28.9 | 20.9 | 0.15 |
| 940412 | 0100 | 1.13 | 0.191 | 0.191 | 5.24 | 5.24 | 28.0 | 8.0 | 13.3 | 38.3 | 29.3 | 25.5 | 0.10 |
| 940412 | 0400 | 1.08 | 0.171 | 0.171 | 5.83 | 5.83 | 10.0 | 6.0 | 10.2 | 38.8 | 34.1 | 30.1 | 0.10 |
| 940412 | 0700 | 0.98 | 0.152 | 0.152 | 6.59 | 6.59 | 14.0 | 6.0 | 10.0 | 45.1 | 42.2 | 31.1 | 0.13 |
| 940412 | 1000 | 0.86 | 0.103 | 0.162 | 9.71 | 6.19 | -22.0 | -32.0 | -5.9 | 45.3 | 44.9 | 44.9 | 0.15 |
| 940412 | 1300 | 0.85 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -24.0 | -11.7 | 43.2 | 43.7 | 28.9 | 0.14 |
| 940412 | 1600 | 0.86 | 0.171 | 0.142 | 5.83 | 7.04 | -42.0 | -38.0 | -22.1 | 40.1 | 41.0 | 29.0 | 0.15 |
| 940412 | 1900 | 0.80 | 0.113 | 0.113 | 8.87 | 8.87 | -24.0 | -22.0 | -22.3 | 37.1 | 37.2 | 22.5 | 0.18 |
| 940412 | 2200 | 0.74 | 0.103 | 0.103 | 9.71 | 9.71 | -22.0 | -20.0 | -23.9 | 34.0 | 35.8 | 24.8 | 0.17 |
| 940413 | 0100 | 0.69 | 0.103 | 0.113 | 9.71 | 8.87 | -16.0 | -16.0 | -25.2 | 31.9 | 33.5 | 30.9 | 0.15 |
| 940413 | 0400 | 0.70 | 0.123 | 0.113 | 8.16 | 8.87 | -18.0 | -16.0 | -24.6 | 33.1 | 33.3 | 28.1 | 0.15 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940413 | 0700 | 0.75 | 0.181 | 0.113 | 5.52 | 8.87 | -26.0 | -26.0 | -28.1 | 34.6 | 31.1 | 26.0 | 0.18 |
| 940413 | 1000 | 0.76 | 0.162 | 0.162 | 6.19 | 6.19 | -44.0 | -40.0 | -37.6 | 32.2 | 28.6 | 24.0 | 0.18 |
| 940413 | 1300 | 0.68 | 0.152 | 0.152 | 6.59 | 6.59 | -38.0 | -36.0 | -36.2 | 30.0 | 23.2 | 23.9 | 0.17 |
| 940413 | 1600 | 0.81 | 0.152 | 0.132 | 6.59 | 7.56 | -36.0 | -56.0 | -41.4 | 25.2 | 14.9 | 14.3 | 0.23 |
| 940413 | 1900 | 0.79 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -40.0 | -41.0 | 20.3 | 15.0 | 15.0 | 0.26 |
| 940413 | 2200 | 0.65 | 0.132 | 0.113 | 7.56 | 8.87 | -38.0 | -38.0 | -39.4 | 22.3 | 18.2 | 19.9 | 0.30 |
| 940414 | 0100 | 0.56 | 0.132 | 0.113 | 7.56 | 8.87 | -38.0 | -38.0 | -32.2 | 23.5 | 20.6 | 21.8 | 0.19 |
| 940414 | 0400 | 0.56 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -38.0 | -32.6 | 23.7 | 21.8 | 23.0 | 0.18 |
| 940414 | 0700 | 0.56 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -40.0 | -35.3 | 23.3 | 21.5 | 18.1 | 0.25 |
| 940414 | 1000 | 0.55 | 0.123 | 0.103 | 8.16 | 9.71 | -38.0 | -38.0 | -39.9 | 22.6 | 19.8 | 23.6 | 0.28 |
| 940414 | 1300 | 0.54 | 0.113 | 0.103 | 8.87 | 9.71 | -36.0 | -38.0 | -36.9 | 22.6 | 21.2 | 19.9 | 0.25 |
| 940414 | 1600 | 0.57 | 0.113 | 0.113 | 8.87 | 8.87 | -38.0 | -40.0 | -35.9 | 23.3 | 21.8 | 18.8 | 0.25 |
| 940415 | 1000 | 0.48 | 0.132 | 0.123 | 7.56 | 8.16 | -38.0 | -38.0 | -34.1 | 31.9 | 26.1 | 22.2 | 0.24 |
| 940416 | 0100 | 0.50 | 0.142 | 0.113 | 7.04 | 8.87 | -38.0 | -38.0 | -29.4 | 35.5 | 24.2 | 29.7 | 0.23 |
| 940416 | 0400 | 0.57 | 0.142 | 0.103 | 7.04 | 9.71 | -38.0 | -48.0 | -34.5 | 34.0 | 20.1 | 25.9 | 0.20 |
| 940416 | 0700 | 0.69 | 0.162 | 0.171 | 6.19 | 5.83 | -44.0 | -54.0 | -42.5 | 24.8 | 16.4 | 14.8 | 0.23 |
| 940416 | 1000 | 0.64 | 0.142 | 0.142 | 7.04 | 7.04 | -40.0 | -42.0 | -43.2 | 25.7 | 18.0 | 18.4 | 0.22 |
| 940416 | 1300 | 0.58 | 0.142 | 0.132 | 7.04 | 7.56 | -40.0 | -40.0 | -42.0 | 26.8 | 21.3 | 23.1 | 0.22 |
| 940416 | 1600 | 0.60 | 0.142 | 0.142 | 7.04 | 7.04 | -40.0 | -40.0 | -44.5 | 27.6 | 23.6 | 20.7 | 0.19 |
| 940416 | 1900 | 0.61 | 0.132 | 0.123 | 7.56 | 8.16 | -40.0 | -40.0 | -42.7 | 26.3 | 22.0 | 23.9 | 0.23 |
| 940416 | 2200 | 0.56 | 0.113 | 0.113 | 8.87 | 8.87 | -38.0 | -38.0 | -40.2 | 22.2 | 22.7 | 19.3 | 0.23 |
| 940417 | 0100 | 0.48 | 0.132 | 0.113 | 7.56 | 8.87 | -38.0 | -40.0 | -32.3 | 27.2 | 29.3 | 25.0 | 0.25 |
| 940417 | 0400 | 0.42 | 0.123 | 0.113 | 8.16 | 8.87 | -36.0 | -38.0 | -22.2 | 38.0 | 31.7 | 29.3 | 0.22 |
| 940417 | 0700 | 0.37 | 0.113 | 0.113 | 8.87 | 8.87 | -34.0 | -36.0 | -29.4 | 35.8 | 31.9 | 26.1 | 0.24 |
| 940417 | 1000 | 0.35 | 0.123 | 0.123 | 8.16 | 8.16 | -42.0 | -40.0 | -32.5 | 35.1 | 30.7 | 25.8 | 0.26 |
| 940417 | 1300 | 0.35 | 0.132 | 0.123 | 7.56 | 8.16 | -38.0 | -38.0 | -26.2 | 34.8 | 29.0 | 31.1 | 0.24 |
| 940417 | 1600 | 0.42 | 0.132 | 0.123 | 7.56 | 8.16 | -42.0 | -40.0 | -33.0 | 36.5 | 24.1 | 32.4 | 0.23 |
| 940417 | 1900 | 0.53 | 0.250 | 0.132 | 4.01 | 7.56 | -60.0 | -60.0 | -44.6 | 38.9 | 18.0 | 25.0 | 0.23 |
| 940417 | 2200 | 0.41 | 0.132 | 0.123 | 7.56 | 8.16 | -38.0 | -60.0 | -40.0 | 38.3 | 17.4 | 20.8 | 0.25 |
| 940418 | 0100 | 0.32 | 0.142 | 0.103 | 7.04 | 9.71 | -40.0 | -40.0 | -32.3 | 34.1 | 25.3 | 31.1 | 0.25 |
| 940418 | 0400 | 0.31 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -20.0 | -20.3 | 34.1 | 29.1 | 18.5 | 0.30 |
| 940418 | 0700 | 0.33 | 0.123 | 0.113 | 8.16 | 8.87 | -20.0 | -20.0 | -23.7 | 31.1 | 26.9 | 24.8 | 0.30 |
| 940418 | 1000 | 0.36 | 0.123 | 0.123 | 8.16 | 8.16 | -20.0 | -18.0 | -22.3 | 33.9 | 30.3 | 25.4 | 0.24 |
| 940418 | 1300 | 0.42 | 0.123 | 0.123 | 8.16 | 8.16 | -18.0 | -20.0 | -8.0 | 43.7 | 27.8 | 18.6 | 0.24 |
| 940418 | 1600 | 0.41 | 0.113 | 0.113 | 8.87 | 8.87 | -12.0 | -20.0 | -17.9 | 29.2 | 27.9 | 21.9 | 0.25 |
| 940418 | 1900 | 0.42 | 0.132 | 0.113 | 7.56 | 8.87 | -24.0 | -22.0 | -21.5 | 27.7 | 25.1 | 23.0 | 0.22 |
| 940418 | 2200 | 0.42 | 0.162 | 0.123 | 6.19 | 8.16 | -6.0 | -6.0 | -15.6 | 29.3 | 28.0 | 20.5 | 0.23 |
| 940419 | 0100 | 0.43 | 0.152 | 0.152 | 6.59 | 6.59 | -4.0 | -4.0 | -11.4 | 26.8 | 24.9 | 20.2 | 0.20 |
| 940419 | 0400 | 0.40 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -6.0 | -15.3 | 28.2 | 25.0 | 26.8 | 0.29 |
| 940419 | 0700 | 0.42 | 0.083 | 0.132 | 11.98 | 7.56 | -10.0 | -8.0 | -20.2 | 32.2 | 23.0 | 29.3 | 0.23 |
| 940419 | 1000 | 0.40 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -20.0 | -26.7 | 31.0 | 21.7 | 16.8 | 0.31 |
| 940419 | 1300 | 0.39 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -56.0 | -33.5 | 32.2 | 19.8 | 18.7 | 0.28 |
| 940419 | 1600 | 0.43 | 0.259 | 0.083 | 3.86 | 11.98 | -56.0 | -56.0 | -40.3 | 35.2 | 13.6 | 18.9 | 0.28 |
| 940419 | 1900 | 0.38 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -56.0 | -35.1 | 36.8 | 15.3 | 18.8 | 0.28 |
| 940419 | 2200 | 0.37 | 0.289 | 0.074 | 3.47 | 13.56 | -58.0 | -56.0 | -35.3 | 36.5 | 15.3 | 16.3 | 0.30 |
| 940420 | 0100 | 0.36 | 0.269 | 0.083 | 3.72 | 11.98 | -58.0 | -58.0 | -37.2 | 38.3 | 12.7 | 20.3 | 0.31 |
| 940420 | 0400 | 0.35 | 0.152 | 0.083 | 6.59 | 11.98 | -42.0 | -56.0 | -34.6 | 38.9 | 14.4 | 20.8 | 0.30 |
| 940420 | 1000 | 0.37 | 0.152 | 0.083 | 6.59 | 11.98 | -44.0 | -44.0 | -35.4 | 36.3 | 21.7 | 26.2 | 0.25 |
| 940420 | 1300 | 0.39 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -24.0 | -33.2 | 39.9 | 31.0 | 25.5 | 0.31 |
| 940420 | 1600 | 0.39 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -54.0 | -28.6 | 41.5 | 30.8 | 22.9 | 0.21 |
| 940420 | 1900 | 0.48 | 0.083 | 0.083 | 11.98 | 11.98 | -22.0 | -22.0 | -22.4 | 36.3 | 29.6 | 28.1 | 0.23 |
| 940420 | 2200 | 0.45 | 0.083 | 0.083 | 11.98 | 11.98 | -18.0 | -10.0 | -23.6 | 35.3 | 27.7 | 24.2 | 0.22 |
| 940421 | 0100 | 0.45 | 0.083 | 0.083 | 11.98 | 11.98 | -6.0 | -34.0 | -31.3 | 40.6 | 30.5 | 23.9 | 0.17 |
| 940421 | 0400 | 0.41 | 0.083 | 0.083 | 11.98 | 11.98 | -24.0 | -24.0 | -36.1 | 41.9 | 41.4 | 26.8 | 0.24 |
| 940421 | 0700 | 0.46 | 0.093 | 0.093 | 10.72 | 10.72 | -14.0 | -16.0 | -2.0 | 53.5 | 40.2 | 29.5 | 0.23 |
| 940421 | 1000 | 0.84 | 0.250 | 0.269 | 4.01 | 3.72 | 38.0 | 38.0 | 22.4 | 34.6 | 23.8 | 22.0 | 0.20 |
| 940421 | 1300 | 0.85 | 0.210 | 0.210 | 4.75 | 4.75 | 2.0 | 2.0 | 8.3 | 31.7 | 24.4 | 20.0 | 0.20 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940421 | 1600 | 0.67 | 0.191 | 0.210 | 5.24 | 4.75 | -4.0 | -2.0 | 3.3 | 32.2 | 26.1 | 22.9 | 0.20 |
| 940421 | 1900 | 0.53 | 0.201 | 0.201 | 4.98 | 4.98 | 0.0 | -2.0 | -0.7 | 26.4 | 24.8 | 14.1 | 0.16 |
| 940421 | 2200 | 0.50 | 0.181 | 0.181 | 5.52 | 5.52 | 2.0 | 2.0 | -2.4 | 24.0 | 24.2 | 8.6 | 0.15 |
| 940422 | 0100 | 0.50 | 0.191 | 0.191 | 5.24 | 5.24 | 0.0 | 0.0 | -3.2 | 26.4 | 23.8 | 11.2 | 0.16 |
| 940422 | 0400 | 0.48 | 0.191 | 0.093 | 5.24 | 10.72 | 14.0 | 0.0 | -1.1 | 36.4 | 32.0 | 31.3 | 0.18 |
| 940422 | 0700 | 1.31 | 0.230 | 0.230 | 4.35 | 4.35 | 44.0 | 46.0 | 40.0 | 28.3 | 24.5 | 22.0 | 0.21 |
| 940422 | 1000 | 1.89 | 0.171 | 0.171 | 5.83 | 5.83 | 40.0 | 42.0 | 38.0 | 22.4 | 21.6 | 17.5 | 0.15 |
| 940422 | 1300 | 2.04 | 0.162 | 0.152 | 6.19 | 6.59 | 36.0 | 38.0 | 36.7 | 18.3 | 18.9 | 14.3 | 0.20 |
| 940422 | 1600 | 1.43 | 0.162 | 0.162 | 6.19 | 6.19 | 38.0 | 38.0 | 26.7 | 31.8 | 27.2 | 30.8 | 0.17 |
| 940422 | 1900 | 1.45 | 0.171 | 0.162 | 5.83 | 6.19 | 40.0 | 40.0 | 27.6 | 31.8 | 25.8 | 21.9 | 0.13 |
| 940422 | 2200 | 1.39 | 0.162 | 0.171 | 6.19 | 5.83 | 6.0 | 6.0 | 16.4 | 33.4 | 26.2 | 23.0 | 0.11 |
| 940423 | 0100 | 1.50 | 0.171 | 0.171 | 5.83 | 5.83 | 8.0 | 6.0 | 10.6 | 34.1 | 26.2 | 24.9 | 0.11 |
| 940423 | 0400 | 1.47 | 0.162 | 0.162 | 6.19 | 6.19 | 6.0 | 4.0 | 13.3 | 30.2 | 25.0 | 17.9 | 0.11 |
| 940423 | 0700 | 1.53 | 0.162 | 0.162 | 6.19 | 6.19 | 10.0 | 8.0 | 12.3 | 30.2 | 23.2 | 17.9 | 0.11 |
| 940423 | 1000 | 1.59 | 0.162 | 0.162 | 6.19 | 6.19 | 8.0 | 2.0 | 11.5 | 29.0 | 23.8 | 20.3 | 0.10 |
| 940423 | 1300 | 1.51 | 0.113 | 0.152 | 8.87 | 6.59 | -6.0 | 2.0 | 8.6 | 27.6 | 24.6 | 21.7 | 0.10 |
| 940423 | 1600 | 1.30 | 0.123 | 0.123 | 8.16 | 8.16 | -4.0 | 2.0 | 7.8 | 31.8 | 29.4 | 18.4 | 0.14 |
| 940423 | 1900 | 1.13 | 0.103 | 0.123 | 9.71 | 8.16 | -2.0 | -2.0 | 6.7 | 30.0 | 29.1 | 22.7 | 0.14 |
| 940423 | 2200 | 1.01 | 0.113 | 0.123 | 8.87 | 8.16 | -4.0 | -4.0 | 4.0 | 25.1 | 27.7 | 17.7 | 0.10 |
| 940424 | 0100 | 0.88 | 0.113 | 0.113 | 8.87 | 8.87 | -4.0 | -2.0 | -5.8 | 25.0 | 26.7 | 12.2 | 0.13 |
| 940424 | 0400 | 0.75 | 0.132 | 0.132 | 7.56 | 7.56 | -12.0 | -6.0 | -11.0 | 27.4 | 27.4 | 22.2 | 0.22 |
| 940424 | 0700 | 0.59 | 0.113 | 0.113 | 8.87 | 8.87 | 0.0 | 0.0 | -4.8 | 30.0 | 29.8 | 18.4 | 0.22 |
| 940424 | 1000 | 0.51 | 0.123 | 0.123 | 8.16 | 8.16 | -8.0 | -6.0 | -10.8 | 27.8 | 26.8 | 19.2 | 0.15 |
| 940424 | 1300 | 0.48 | 0.132 | 0.132 | 7.56 | 7.56 | -2.0 | -14.0 | -18.6 | 30.6 | 28.8 | 23.9 | 0.19 |
| 940424 | 1600 | 0.54 | 0.259 | 0.123 | 3.86 | 8.16 | -60.0 | -60.0 | -35.6 | 42.9 | 22.9 | 24.7 | 0.29 |
| 940424 | 1900 | 0.53 | 0.259 | 0.123 | 3.86 | 8.16 | -58.0 | -58.0 | -38.1 | 39.3 | 17.0 | 25.6 | 0.31 |
| 940424 | 2200 | 0.38 | 0.123 | 0.132 | 8.16 | 7.56 | -16.0 | -40.0 | -25.3 | 31.3 | 20.3 | 20.5 | 0.27 |
| 940425 | 0100 | 0.35 | 0.142 | 0.074 | 7.04 | 13.56 | -36.0 | -38.0 | -28.0 | 31.6 | 21.6 | 28.4 | 0.33 |
| 940425 | 0400 | 0.34 | 0.074 | 0.074 | 13.56 | 13.56 | 0.0 | -40.0 | -23.0 | 33.0 | 20.8 | 26.6 | 0.48 |
| 940425 | 0700 | 0.30 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | -10.0 | -22.7 | 31.1 | 23.1 | 24.2 | 0.38 |
| 940425 | 1000 | 0.31 | 0.074 | 0.074 | 13.56 | 13.56 | -4.0 | -12.0 | -21.7 | 31.1 | 25.2 | 22.3 | 0.40 |
| 940425 | 1300 | 0.35 | 0.064 | 0.074 | 15.63 | 13.56 | -12.0 | -14.0 | -17.4 | 31.2 | 27.8 | 25.7 | 0.37 |
| 940425 | 1600 | 0.35 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | -36.0 | -24.2 | 34.0 | 27.7 | 30.8 | 0.44 |
| 940425 | 1900 | 0.37 | 0.074 | 0.074 | 13.56 | 13.56 | -14.0 | -26.0 | -26.5 | 31.1 | 25.1 | 29.0 | 0.43 |
| 940425 | 2200 | 0.36 | 0.074 | 0.074 | 13.56 | 13.56 | -14.0 | -24.0 | -27.6 | 31.8 | 24.6 | 25.5 | 0.43 |
| 940426 | 0100 | 0.36 | 0.123 | 0.074 | 8.16 | 13.56 | -36.0 | -36.0 | -26.0 | 31.0 | 24.2 | 26.4 | 0.51 |
| 940426 | 0400 | 0.37 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | -38.0 | -21.3 | 35.4 | 28.0 | 27.4 | 0.34 |
| 940426 | 1000 | 0.32 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | -26.0 | -19.6 | 37.5 | 29.6 | 24.8 | 0.54 |
| 940426 | 1300 | 0.34 | 0.074 | 0.083 | 13.56 | 11.98 | -6.0 | -22.0 | -22.4 | 37.6 | 27.3 | 30.5 | 0.44 |
| 940426 | 1600 | 0.33 | 0.083 | 0.083 | 11.98 | 11.98 | -4.0 | -38.0 | -22.3 | 36.8 | 28.8 | 33.0 | 0.46 |
| 940426 | 1900 | 0.38 | 0.250 | 0.083 | 4.01 | 11.98 | -90.0 | -38.0 | -37.1 | 47.5 | 37.6 | 34.3 | 0.41 |
| 940426 | 2200 | 0.37 | 0.074 | 0.083 | 13.56 | 11.98 | 2.0 | -90.0 | -24.1 | 54.2 | 36.7 | 29.1 | 0.41 |
| 940427 | 0100 | 0.36 | 0.083 | 0.083 | 11.98 | 11.98 | -4.0 | -18.0 | -16.8 | 46.8 | 36.2 | 25.0 | 0.25 |
| 940427 | 0400 | 0.36 | 0.083 | 0.083 | 11.98 | 11.98 | -24.0 | -16.0 | -21.0 | 45.2 | 38.5 | 28.5 | 0.32 |
| 940427 | 0700 | 0.36 | 0.083 | 0.083 | 11.98 | 11.98 | -6.0 | -42.0 | -32.0 | 45.5 | 34.8 | 27.9 | 0.24 |
| 940427 | 1000 | 0.33 | 0.083 | 0.083 | 11.98 | 11.98 | -4.0 | -40.0 | -32.5 | 45.7 | 33.3 | 27.9 | 0.29 |
| 940427 | 1300 | 0.36 | 0.240 | 0.083 | 4.17 | 11.98 | -52.0 | -56.0 | -34.8 | 48.0 | 27.2 | 32.1 | 0.25 |
| 940427 | 1600 | 0.38 | 0.318 | 0.083 | 3.15 | 11.98 | -58.0 | -58.0 | -26.0 | 49.5 | 23.9 | 26.3 | 0.34 |
| 940427 | 1900 | 0.30 | 0.064 | 0.083 | 15.63 | 11.98 | -10.0 | -40.0 | -25.6 | 44.6 | 31.5 | 32.1 | 0.31 |
| 940427 | 2200 | 0.28 | 0.064 | 0.083 | 15.63 | 11.98 | -10.0 | -12.0 | -27.0 | 38.9 | 28.5 | 28.0 | 0.35 |
| 940428 | 0100 | 0.27 | 0.064 | 0.083 | 15.63 | 11.98 | -24.0 | -32.0 | -28.3 | 34.0 | 28.6 | 30.1 | 0.35 |
| 940428 | 0400 | 0.28 | 0.093 | 0.083 | 10.72 | 11.98 | -24.0 | -36.0 | -26.0 | 33.0 | 28.4 | 29.0 | 0.37 |
| 940428 | 0700 | 0.29 | 0.074 | 0.083 | 13.56 | 11.98 | -14.0 | -38.0 | -28.4 | 34.6 | 27.3 | 28.4 | 0.40 |
| 940428 | 1000 | 0.30 | 0.142 | 0.083 | 7.04 | 11.98 | -40.0 | -40.0 | -26.7 | 38.5 | 31.5 | 27.8 | 0.31 |
| 940428 | 1300 | 0.32 | 0.064 | 0.064 | 15.63 | 15.63 | 8.0 | -18.0 | -26.1 | 40.4 | 25.9 | 25.0 | 0.32 |
| 940428 | 1600 | 0.33 | 0.074 | 0.064 | 13.56 | 15.63 | -12.0 | -12.0 | -22.8 | 34.7 | 30.5 | 19.1 | 0.40 |
| 940428 | 1900 | 0.37 | 0.074 | 0.074 | 13.56 | 13.56 | -10.0 | -26.0 | -4.5 | 46.5 | 40.2 | 29.6 | 0.33 |
| 940428 | 2200 | 0.46 | 0.064 | 0.064 | 15.63 | 15.63 | -12.0 | -14.0 | 9.6 | 59.6 | 26.0 | 27.6 | 0.28 |

*(Sheet 30 of 35)*

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940429 | 0100 | 0.50 | 0.230 | 0.064 | 4.35 | 15.63 | 32.0 | 32.0 | 6.6 | 50.1 | 24.7 | 30.0 | 0.29 |
| 940429 | 0400 | 0.49 | 0.064 | 0.064 | 15.63 | 15.63 | -8.0 | -12.0 | 0.5 | 46.8 | 28.5 | 25.7 | 0.24 |
| 940429 | 0700 | 0.48 | 0.074 | 0.074 | 13.56 | 13.56 | -10.0 | -2.0 | 2.3 | 43.3 | 27.8 | 23.2 | 0.27 |
| 940429 | 1000 | 0.46 | 0.064 | 0.074 | 15.63 | 13.56 | -4.0 | -2.0 | -4.0 | 37.2 | 29.1 | 28.4 | 0.29 |
| 940429 | 1300 | 0.46 | 0.064 | 0.074 | 15.63 | 13.56 | -4.0 | -4.0 | -3.7 | 34.9 | 28.3 | 30.0 | 0.36 |
| 940429 | 1600 | 0.50 | 0.074 | 0.074 | 13.56 | 13.56 | 0.0 | -8.0 | -14.2 | 37.3 | 36.7 | 26.1 | 0.25 |
| 940429 | 1900 | 0.50 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | 4.0 | -15.2 | 39.2 | 37.2 | 27.4 | 0.29 |
| 940429 | 2200 | 0.53 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | 22.0 | 2.9 | 40.1 | 34.8 | 28.4 | 0.34 |
| 940430 | 0100 | 0.52 | 0.074 | 0.074 | 13.56 | 13.56 | 8.0 | 8.0 | -0.2 | 37.4 | 35.2 | 30.1 | 0.38 |
| 940430 | 0400 | 0.53 | 0.074 | 0.074 | 13.56 | 13.56 | -12.0 | 6.0 | -2.6 | 35.4 | 34.4 | 28.4 | 0.22 |
| 940430 | 0700 | 0.55 | 0.074 | 0.074 | 13.56 | 13.56 | 0.0 | 14.0 | -4.7 | 39.6 | 38.3 | 23.7 | 0.33 |
| 940430 | 1000 | 0.52 | 0.074 | 0.074 | 13.56 | 13.56 | 4.0 | 6.0 | -5.5 | 41.9 | 41.9 | 23.9 | 0.29 |
| 940430 | 1300 | 0.47 | 0.074 | 0.074 | 13.56 | 13.56 | 6.0 | 8.0 | -20.5 | 45.1 | 39.2 | 27.5 | 0.32 |
| 940430 | 1600 | 0.53 | 0.318 | 0.074 | 3.15 | 13.56 | -56.0 | -56.0 | -31.6 | 43.4 | 26.2 | 25.5 | 0.24 |
| 940430 | 1900 | 0.55 | 0.132 | 0.074 | 7.56 | 13.56 | -38.0 | -38.0 | -31.3 | 42.3 | 23.9 | 21.9 | 0.23 |
| 940430 | 2200 | 0.51 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -40.0 | -33.3 | 38.1 | 22.8 | 21.6 | 0.22 |
| 940501 | 0100 | 0.45 | 0.132 | 0.132 | 7.56 | 7.56 | -38.0 | -38.0 | -33.1 | 38.8 | 21.1 | 19.7 | 0.28 |
| 940501 | 0400 | 0.44 | 0.132 | 0.132 | 7.56 | 7.56 | -36.0 | -38.0 | -34.4 | 30.3 | 20.1 | 16.6 | 0.26 |
| 940501 | 0700 | 0.52 | 0.162 | 0.142 | 6.19 | 7.04 | -40.0 | -38.0 | -35.4 | 24.6 | 18.3 | 22.9 | 0.20 |
| 940501 | 1000 | 0.48 | 0.171 | 0.162 | 5.83 | 6.19 | -38.0 | -38.0 | -37.4 | 22.1 | 18.2 | 14.8 | 0.23 |
| 940501 | 1300 | 0.47 | 0.171 | 0.152 | 5.83 | 6.59 | -44.0 | -42.0 | -41.3 | 23.9 | 18.5 | 17.3 | 0.23 |
| 940501 | 1600 | 0.49 | 0.142 | 0.142 | 7.04 | 7.04 | -38.0 | -40.0 | -41.5 | 25.3 | 17.4 | 17.9 | 0.24 |
| 940501 | 1900 | 0.44 | 0.142 | 0.142 | 7.04 | 7.04 | -38.0 | -38.0 | -39.1 | 23.1 | 16.7 | 12.3 | 0.22 |
| 940501 | 2200 | 0.51 | 0.142 | 0.142 | 7.04 | 7.04 | -40.0 | -40.0 | -20.3 | 49.5 | 35.8 | 11.9 | 0.21 |
| 940502 | 0100 | 1.53 | 0.191 | 0.191 | 5.24 | 5.24 | 36.0 | 34.0 | 36.9 | 24.0 | 23.5 | 13.5 | 0.17 |
| 940502 | 0400 | 2.09 | 0.162 | 0.162 | 6.19 | 6.19 | 28.0 | 28.0 | 35.4 | 20.1 | 19.1 | 13.5 | 0.17 |
| 940502 | 0700 | 2.30 | 0.132 | 0.152 | 7.56 | 6.59 | 14.0 | 16.0 | 32.2 | 23.0 | 20.6 | 14.7 | 9.99 |
| 940502 | 1000 | 1.75 | 0.142 | 0.142 | 7.04 | 7.04 | 22.0 | 22.0 | 35.3 | 25.5 | 22.6 | 11.9 | 0.18 |
| 940502 | 1300 | 1.33 | 0.142 | 0.142 | 7.04 | 7.04 | 22.0 | 40.0 | 37.7 | 27.3 | 25.0 | 15.8 | 0.18 |
| 940502 | 1600 | 1.03 | 0.142 | 0.142 | 7.04 | 7.04 | 30.0 | 34.0 | 28.9 | 28.1 | 25.0 | 20.6 | 0.16 |
| 940502 | 1900 | 0.85 | 0.142 | 0.142 | 7.04 | 7.04 | 24.0 | 36.0 | 22.8 | 32.4 | 25.3 | 23.9 | 0.16 |
| 940502 | 2200 | 0.84 | 0.162 | 0.162 | 6.19 | 6.19 | 24.0 | 24.0 | 15.8 | 41.3 | 28.9 | 20.1 | 0.16 |
| 940503 | 0100 | 0.95 | 0.171 | 0.171 | 5.83 | 5.83 | 28.0 | 26.0 | 17.3 | 36.8 | 29.7 | 31.3 | 0.12 |
| 940503 | 0400 | 1.09 | 0.230 | 0.201 | 4.35 | 4.98 | 28.0 | 6.0 | 16.0 | 36.7 | 31.2 | 30.5 | 0.11 |
| 940503 | 0700 | 1.21 | 0.201 | 0.201 | 4.98 | 4.98 | 8.0 | 6.0 | 15.1 | 36.0 | 28.4 | 21.6 | 0.10 |
| 940503 | 1000 | 1.29 | 0.181 | 0.181 | 5.52 | 5.52 | 8.0 | 4.0 | 12.0 | 33.7 | 26.0 | 19.3 | 0.10 |
| 940503 | 1300 | 1.41 | 0.181 | 0.181 | 5.52 | 5.52 | 4.0 | 6.0 | 14.8 | 34.4 | 25.4 | 16.1 | 0.12 |
| 940503 | 1600 | 1.56 | 0.162 | 0.162 | 6.19 | 6.19 | -2.0 | 0.0 | 10.0 | 32.7 | 25.0 | 15.7 | 0.12 |
| 940503 | 1900 | 1.70 | 0.162 | 0.162 | 6.19 | 6.19 | 4.0 | 4.0 | 6.5 | 26.5 | 24.9 | 15.9 | 0.11 |
| 940503 | 2200 | 2.03 | 0.142 | 0.142 | 7.04 | 7.04 | 4.0 | 4.0 | -1.3 | 33.2 | 36.3 | 24.3 | 0.13 |
| 940504 | 0100 | 2.23 | 0.132 | 0.132 | 7.56 | 7.56 | -2.0 | 0.0 | -5.0 | 32.8 | 35.3 | 24.5 | 0.14 |
| 940504 | 0400 | 2.55 | 0.123 | 0.123 | 8.16 | 8.16 | -16.0 | -16.0 | -9.1 | 32.5 | 32.9 | 26.9 | 0.14 |
| 940504 | 0700 | 2.96 | 0.113 | 0.113 | 8.87 | 8.87 | -6.0 | -12.0 | 8.5 | 37.8 | 36.4 | 27.8 | 0.13 |
| 940504 | 1000 | 3.56 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -12.0 | -1.3 | 32.9 | 30.8 | 26.2 | 0.14 |
| 940504 | 1300 | 3.23 | 0.103 | 0.103 | 9.71 | 9.71 | -6.0 | -8.0 | 7.0 | 30.9 | 30.3 | 23.5 | 0.14 |
| 940504 | 1600 | 2.55 | 0.103 | 0.103 | 9.71 | 9.71 | 12.0 | 12.0 | 18.6 | 27.8 | 24.9 | 21.2 | 0.15 |
| 940504 | 1900 | 2.36 | 0.093 | 0.103 | 10.72 | 9.71 | 8.0 | 42.0 | 20.9 | 30.8 | 20.4 | 20.9 | 0.19 |
| 940504 | 2200 | 2.15 | 0.113 | 0.113 | 8.87 | 8.87 | 12.0 | 16.0 | 22.1 | 28.5 | 20.7 | 24.9 | 0.18 |
| 940505 | 0100 | 2.14 | 0.093 | 0.093 | 10.72 | 10.72 | 12.0 | 12.0 | 19.3 | 25.4 | 20.8 | 13.4 | 0.18 |
| 940505 | 0400 | 2.04 | 0.083 | 0.083 | 11.98 | 11.98 | 12.0 | 12.0 | 21.5 | 24.8 | 20.8 | 15.6 | 0.18 |
| 940505 | 0700 | 1.87 | 0.083 | 0.093 | 11.98 | 10.72 | 8.0 | 10.0 | 18.0 | 23.3 | 21.0 | 18.1 | 0.15 |
| 940505 | 1000 | 1.65 | 0.132 | 0.132 | 7.56 | 7.56 | 12.0 | 10.0 | 15.4 | 21.0 | 19.7 | 15.8 | 0.13 |
| 940505 | 1300 | 1.59 | 0.083 | 0.113 | 11.98 | 8.87 | 4.0 | 10.0 | 14.7 | 24.0 | 22.6 | 29.7 | 0.17 |
| 940505 | 1600 | 1.44 | 0.083 | 0.113 | 11.98 | 8.87 | 8.0 | 10.0 | 13.5 | 25.9 | 24.1 | 28.3 | 0.21 |
| 940505 | 1900 | 1.45 | 0.093 | 0.113 | 10.72 | 8.87 | 6.0 | 8.0 | 8.8 | 24.5 | 24.4 | 25.3 | 0.17 |
| 940505 | 2200 | 1.27 | 0.093 | 0.113 | 10.72 | 8.87 | 10.0 | 8.0 | 9.7 | 25.1 | 25.4 | 23.5 | 0.12 |
| 940506 | 0100 | 1.22 | 0.083 | 0.083 | 11.98 | 11.98 | 8.0 | 10.0 | 10.5 | 24.7 | 25.3 | 19.2 | 0.18 |
| 940506 | 0400 | 1.08 | 0.083 | 0.083 | 11.98 | 11.98 | 6.0 | 8.0 | 9.0 | 27.1 | 26.6 | 23.1 | 0.21 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940506 | 0700 | 1.11 | 0.083 | 0.083 | 11.98 | 11.98 | 4.0 | 4.0 | 2.3 | 24.1 | 24.1 | 21.3 | 0.21 |
| 940506 | 1000 | 0.94 | 0.093 | 0.093 | 10.72 | 10.72 | -2.0 | -2.0 | -0.8 | 25.4 | 25.9 | 20.0 | 0.15 |
| 940506 | 1300 | 0.86 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 0.0 | -4.6 | 23.7 | 25.0 | 18.8 | 0.22 |
| 940506 | 1600 | 0.69 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 6.0 | -3.7 | 28.2 | 28.5 | 21.9 | 0.30 |
| 940506 | 1900 | 0.64 | 0.093 | 0.093 | 10.72 | 10.72 | 0.0 | 0.0 | -8.5 | 29.8 | 27.3 | 20.4 | 0.34 |
| 940506 | 2200 | 0.61 | 0.083 | 0.083 | 11.98 | 11.98 | 2.0 | 2.0 | -5.2 | 30.5 | 27.3 | 24.5 | 0.21 |
| 940507 | 0100 | 0.58 | 0.103 | 0.103 | 9.71 | 9.71 | -10.0 | -14.0 | -14.3 | 29.4 | 27.3 | 21.8 | 0.26 |
| 940507 | 0400 | 0.56 | 0.103 | 0.103 | 9.71 | 9.71 | 6.0 | 2.0 | -9.5 | 31.7 | 28.1 | 21.7 | 0.27 |
| 940507 | 0700 | 0.51 | 0.093 | 0.083 | 10.72 | 11.98 | 8.0 | 6.0 | -18.1 | 34.6 | 29.7 | 28.6 | 0.25 |
| 940507 | 1000 | 0.50 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | 0.0 | -13.3 | 32.3 | 28.4 | 23.9 | 0.22 |
| 940507 | 1300 | 0.49 | 0.103 | 0.083 | 9.71 | 11.98 | 10.0 | -14.0 | -8.1 | 33.6 | 29.1 | 28.9 | 0.24 |
| 940507 | 1600 | 0.49 | 0.103 | 0.083 | 9.71 | 11.98 | -8.0 | -14.0 | -21.2 | 35.9 | 24.4 | 31.1 | 0.27 |
| 940507 | 1900 | 0.45 | 0.093 | 0.083 | 10.72 | 11.98 | -10.0 | -14.0 | -16.2 | 31.5 | 26.9 | 30.6 | 0.27 |
| 940507 | 2200 | 0.42 | 0.083 | 0.083 | 11.98 | 11.98 | -22.0 | -22.0 | -31.8 | 32.2 | 26.5 | 25.5 | 0.27 |
| 940508 | 0100 | 0.41 | 0.083 | 0.083 | 11.98 | 11.98 | -8.0 | -34.0 | -22.5 | 32.9 | 26.2 | 29.6 | 0.26 |
| 940508 | 0400 | 0.47 | 0.132 | 0.123 | 7.56 | 8.16 | -40.0 | -38.0 | -37.0 | 26.5 | 20.8 | 19.4 | 0.27 |
| 940508 | 0700 | 0.47 | 0.132 | 0.123 | 7.56 | 8.16 | -40.0 | -38.0 | -35.5 | 26.9 | 19.4 | 21.0 | 0.22 |
| 940508 | 1000 | 0.42 | 0.132 | 0.113 | 7.56 | 8.87 | -38.0 | -38.0 | -34.7 | 26.3 | 21.8 | 19.3 | 0.22 |
| 940508 | 1300 | 0.47 | 0.132 | 0.113 | 7.56 | 8.87 | -38.0 | -38.0 | -37.0 | 26.6 | 25.0 | 23.8 | 0.24 |
| 940508 | 1600 | 0.49 | 0.123 | 0.113 | 8.16 | 8.87 | -40.0 | -40.0 | -33.0 | 27.8 | 25.7 | 21.0 | 0.24 |
| 940508 | 1900 | 0.46 | 0.132 | 0.113 | 7.56 | 8.87 | -44.0 | -44.0 | -34.0 | 31.4 | 29.3 | 23.6 | 0.19 |
| 940508 | 2200 | 0.48 | 0.318 | 0.123 | 3.15 | 8.16 | 62.0 | 62.0 | 8.7 | 89.4 | 26.0 | 20.3 | 0.28 |
| 940509 | 0100 | 0.47 | 0.230 | 0.123 | 4.35 | 8.16 | 60.0 | 62.0 | 8.9 | 85.9 | 21.7 | 22.0 | 0.21 |
| 940509 | 0400 | 0.41 | 0.113 | 0.113 | 8.87 | 8.87 | -26.0 | 52.0 | 5.6 | 79.5 | 23.4 | 18.5 | 0.21 |
| 940509 | 0700 | 0.37 | 0.123 | 0.113 | 8.16 | 8.87 | -40.0 | -38.0 | -10.3 | 63.2 | 25.4 | 24.1 | 0.24 |
| 940509 | 1000 | 0.36 | 0.123 | 0.113 | 8.16 | 8.87 | -22.0 | -22.0 | -22.3 | 33.1 | 26.2 | 25.3 | 0.24 |
| 940509 | 1300 | 0.41 | 0.132 | 0.123 | 7.56 | 8.16 | -38.0 | -36.0 | -26.2 | 27.2 | 24.6 | 21.1 | 0.21 |
| 940509 | 1600 | 0.40 | 0.132 | 0.113 | 7.56 | 8.87 | -38.0 | -38.0 | -30.1 | 26.7 | 25.9 | 20.5 | 0.22 |
| 940509 | 1900 | 0.40 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -20.0 | -25.4 | 25.6 | 26.1 | 16.3 | 0.20 |
| 940509 | 2200 | 0.41 | 0.123 | 0.123 | 8.16 | 8.16 | -18.0 | -16.0 | -25.3 | 25.0 | 25.0 | 16.3 | 0.24 |
| 940510 | 0100 | 0.45 | 0.123 | 0.113 | 8.16 | 8.87 | -18.0 | -36.0 | -28.0 | 26.4 | 25.4 | 22.9 | 0.19 |
| 940510 | 0400 | 0.48 | 0.123 | 0.113 | 8.16 | 8.87 | -32.0 | -36.0 | -31.6 | 26.3 | 25.3 | 21.7 | 0.21 |
| 940510 | 0700 | 0.49 | 0.113 | 0.113 | 8.87 | 8.87 | -36.0 | -36.0 | -35.9 | 26.3 | 25.7 | 27.7 | 0.22 |
| 940510 | 1000 | 0.45 | 0.123 | 0.113 | 8.16 | 8.87 | -20.0 | -36.0 | -27.8 | 25.6 | 24.0 | 21.1 | 0.24 |
| 940510 | 1300 | 0.46 | 0.123 | 0.113 | 8.16 | 8.87 | -20.0 | -36.0 | -27.9 | 25.2 | 22.7 | 22.8 | 0.20 |
| 940510 | 1600 | 0.47 | 0.142 | 0.123 | 7.04 | 8.16 | -36.0 | -38.0 | -25.8 | 29.3 | 25.6 | 20.5 | 0.24 |
| 940510 | 1900 | 0.54 | 0.132 | 0.113 | 7.56 | 8.87 | -24.0 | -24.0 | -8.2 | 45.6 | 21.1 | 25.9 | 0.28 |
| 940510 | 2200 | 0.52 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -20.0 | -20.3 | 30.1 | 24.0 | 26.6 | 0.26 |
| 940511 | 0100 | 0.56 | 0.113 | 0.123 | 8.87 | 8.16 | -22.0 | -22.0 | -17.2 | 31.0 | 24.4 | 24.8 | 0.16 |
| 940511 | 0400 | 0.56 | 0.132 | 0.123 | 7.56 | 8.16 | -34.0 | -34.0 | -17.7 | 33.5 | 27.1 | 22.9 | 0.21 |
| 940511 | 0700 | 0.55 | 0.123 | 0.123 | 8.16 | 8.16 | -16.0 | -16.0 | -14.1 | 30.0 | 26.8 | 25.0 | 0.21 |
| 940511 | 1000 | 0.57 | 0.123 | 0.123 | 8.16 | 8.16 | -18.0 | -14.0 | -12.4 | 26.8 | 26.0 | 20.7 | 0.22 |
| 940511 | 1300 | 0.58 | 0.132 | 0.132 | 7.56 | 7.56 | -16.0 | -14.0 | -18.6 | 28.6 | 27.8 | 23.2 | 0.15 |
| 940511 | 1600 | 0.63 | 0.142 | 0.142 | 7.04 | 7.04 | -36.0 | -36.0 | -24.5 | 26.3 | 26.4 | 23.4 | 0.19 |
| 940511 | 1900 | 0.62 | 0.152 | 0.132 | 6.59 | 7.56 | -38.0 | -36.0 | -31.9 | 29.2 | 28.5 | 23.0 | 0.19 |
| 940511 | 2200 | 0.60 | 0.132 | 0.132 | 7.56 | 7.56 | -16.0 | -16.0 | -24.5 | 25.2 | 26.2 | 16.6 | 0.21 |
| 940512 | 0100 | 0.58 | 0.123 | 0.123 | 8.16 | 8.16 | -34.0 | -12.0 | -29.8 | 28.4 | 26.4 | 26.6 | 0.14 |
| 940512 | 0400 | 0.62 | 0.123 | 0.123 | 8.16 | 8.16 | -12.0 | -12.0 | -28.7 | 31.1 | 25.6 | 23.7 | 0.18 |
| 940512 | 0700 | 0.59 | 0.123 | 0.123 | 8.16 | 8.16 | -36.0 | -38.0 | -35.3 | 32.1 | 24.5 | 25.2 | 0.21 |
| 940512 | 1000 | 0.55 | 0.123 | 0.123 | 8.16 | 8.16 | -34.0 | -36.0 | -33.3 | 32.1 | 24.1 | 25.1 | 0.22 |
| 940512 | 1300 | 0.54 | 0.123 | 0.123 | 8.16 | 8.16 | -14.0 | -36.0 | -33.0 | 30.7 | 22.8 | 22.9 | 0.18 |
| 940512 | 1600 | 0.56 | 0.132 | 0.132 | 7.56 | 7.56 | -18.0 | -36.0 | -29.1 | 28.1 | 22.3 | 21.6 | 0.19 |
| 940512 | 1900 | 0.77 | 0.269 | 0.269 | 3.72 | 3.72 | 62.0 | -38.0 | 18.1 | 88.4 | 30.3 | 14.7 | 0.29 |
| 940512 | 2200 | 1.60 | 0.191 | 0.191 | 5.24 | 5.24 | 48.0 | 50.0 | 45.0 | 19.5 | 18.4 | 13.5 | 0.21 |
| 940513 | 0100 | 1.62 | 0.162 | 0.162 | 6.19 | 6.19 | 26.0 | 40.0 | 38.7 | 20.4 | 17.1 | 13.9 | 0.20 |
| 940513 | 0400 | 1.31 | 0.171 | 0.171 | 5.83 | 5.83 | 36.0 | 36.0 | 36.8 | 22.3 | 18.3 | 12.4 | 0.20 |
| 940513 | 0700 | 1.35 | 0.171 | 0.171 | 5.83 | 5.83 | 26.0 | 56.0 | 36.0 | 32.6 | 21.6 | 18.2 | 0.21 |
| 940513 | 1000 | 1.17 | 0.171 | 0.171 | 5.83 | 5.83 | 38.0 | 38.0 | 34.8 | 29.4 | 20.2 | 14.1 | 0.19 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940513 | 1300 | 1.03 | 0.162 | 0.171 | 6.19 | 5.83 | 24.0 | 42.0 | 30.5 | 31.3 | 18.5 | 13.9 | 0.18 |
| 940513 | 1600 | 0.88 | 0.171 | 0.113 | 5.83 | 8.87 | 28.0 | 30.0 | 24.9 | 45.9 | 22.3 | 23.1 | 0.16 |
| 940513 | 1900 | 0.79 | 0.181 | 0.113 | 5.52 | 8.87 | 30.0 | 30.0 | 19.2 | 46.3 | 25.9 | 25.8 | 0.17 |
| 940513 | 2200 | 0.62 | 0.113 | 0.113 | 8.87 | 8.87 | -18.0 | -14.0 | 11.8 | 49.7 | 31.0 | 21.6 | 0.21 |
| 940514 | 0100 | 0.53 | 0.103 | 0.103 | 9.71 | 9.71 | -16.0 | -12.0 | 6.7 | 42.7 | 33.2 | 18.9 | 0.17 |
| 940514 | 0400 | 0.50 | 0.103 | 0.113 | 9.71 | 8.87 | -22.0 | -20.0 | -3.2 | 34.8 | 32.5 | 24.4 | 0.16 |
| 940514 | 0700 | 0.50 | 0.113 | 0.113 | 8.87 | 8.87 | -16.0 | -34.0 | -10.5 | 33.6 | 33.7 | 24.3 | 0.22 |
| 940514 | 1000 | 0.51 | 0.103 | 0.113 | 9.71 | 8.87 | -28.0 | -28.0 | -18.2 | 28.7 | 28.7 | 24.0 | 0.24 |
| 940514 | 1300 | 0.49 | 0.113 | 0.113 | 8.87 | 8.87 | -30.0 | -16.0 | -18.5 | 28.1 | 29.4 | 22.5 | 0.22 |
| 940514 | 1600 | 0.48 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -16.0 | -16.6 | 25.3 | 29.2 | 22.3 | 0.23 |
| 940514 | 1900 | 0.51 | 0.103 | 0.103 | 9.71 | 9.71 | -34.0 | -32.0 | -16.4 | 30.6 | 35.2 | 24.9 | 0.18 |
| 940514 | 2200 | 0.46 | 0.103 | 0.103 | 9.71 | 9.71 | -26.0 | -26.0 | -24.7 | 31.0 | 33.3 | 26.2 | 0.22 |
| 940515 | 0100 | 0.41 | 0.103 | 0.103 | 9.71 | 9.71 | -22.0 | -26.0 | -14.3 | 33.5 | 31.5 | 20.4 | 0.27 |
| 940515 | 0400 | 0.41 | 0.113 | 0.113 | 8.87 | 8.87 | -24.0 | -24.0 | -19.2 | 30.4 | 27.3 | 16.5 | 0.25 |
| 940515 | 0700 | 0.40 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -24.0 | -23.8 | 26.5 | 25.3 | 15.7 | 0.28 |
| 940515 | 1000 | 0.42 | 0.103 | 0.103 | 9.71 | 9.71 | -32.0 | -26.0 | -29.6 | 25.6 | 23.8 | 24.2 | 0.25 |
| 940515 | 1300 | 0.51 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -54.0 | -37.4 | 33.8 | 16.3 | 19.9 | 0.24 |
| 940515 | 1600 | 0.53 | 0.113 | 0.103 | 8.87 | 9.71 | -20.0 | -52.0 | -36.5 | 31.2 | 14.5 | 17.2 | 0.23 |
| 940515 | 1900 | 0.51 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -56.0 | -36.5 | 29.4 | 14.8 | 19.1 | 0.28 |
| 940515 | 2200 | 0.42 | 0.103 | 0.103 | 9.71 | 9.71 | -26.0 | -38.0 | -33.9 | 27.9 | 18.8 | 23.2 | 0.27 |
| 940516 | 0100 | 0.38 | 0.103 | 0.103 | 9.71 | 9.71 | -18.0 | -36.0 | -28.9 | 25.2 | 19.0 | 19.5 | 0.29 |
| 940516 | 0400 | 0.38 | 0.103 | 0.103 | 9.71 | 9.71 | -20.0 | -36.0 | -31.9 | 25.1 | 20.2 | 16.8 | 0.30 |
| 940516 | 0700 | 0.40 | 0.103 | 0.103 | 9.71 | 9.71 | -22.0 | -38.0 | -35.4 | 25.0 | 20.4 | 21.9 | 0.25 |
| 940516 | 1000 | 0.41 | 0.142 | 0.103 | 7.04 | 9.71 | -42.0 | -42.0 | -36.7 | 27.0 | 21.1 | 23.9 | 0.26 |
| 940516 | 1300 | 0.40 | 0.103 | 0.103 | 9.71 | 9.71 | -28.0 | -42.0 | -35.6 | 25.1 | 18.8 | 15.0 | 0.22 |
| 940516 | 1600 | 0.39 | 0.142 | 0.103 | 7.04 | 9.71 | -44.0 | -24.0 | -32.8 | 24.9 | 20.8 | 21.8 | 0.25 |
| 940516 | 1900 | 0.41 | 0.113 | 0.113 | 8.87 | 8.87 | -22.0 | -24.0 | -33.3 | 24.2 | 19.1 | 15.0 | 0.26 |
| 940516 | 2200 | 0.53 | 0.289 | 0.308 | 3.47 | 3.25 | 70.0 | 68.0 | 19.8 | 99.6 | 25.3 | 11.9 | 0.32 |
| 940517 | 0100 | 1.11 | 0.220 | 0.220 | 4.54 | 4.54 | 52.0 | 54.0 | 43.9 | 23.2 | 22.2 | 16.6 | 0.18 |
| 940517 | 0400 | 0.96 | 0.210 | 0.201 | 4.75 | 4.98 | 52.0 | 54.0 | 47.1 | 26.5 | 23.4 | 20.6 | 0.21 |
| 940517 | 0700 | 1.28 | 0.210 | 0.201 | 4.75 | 4.98 | 50.0 | 50.0 | 43.1 | 19.7 | 17.0 | 13.3 | 0.22 |
| 940517 | 1000 | 1.75 | 0.171 | 0.171 | 5.83 | 5.83 | 36.0 | 38.0 | 41.9 | 18.8 | 17.2 | 14.3 | 0.26 |
| 940517 | 1300 | 1.50 | 0.171 | 0.171 | 5.83 | 5.83 | 34.0 | 46.0 | 39.0 | 17.1 | 13.8 | 9.1 | 0.24 |
| 940517 | 1600 | 1.16 | 0.181 | 0.181 | 5.52 | 5.52 | 36.0 | 34.0 | 37.2 | 17.8 | 15.4 | 10.1 | 0.20 |
| 940517 | 1900 | 0.87 | 0.162 | 0.181 | 6.19 | 5.52 | 24.0 | 34.0 | 33.4 | 18.5 | 14.6 | 9.8 | 0.14 |
| 940517 | 2200 | 1.13 | 0.201 | 0.201 | 4.98 | 4.98 | 48.0 | 48.0 | 43.6 | 19.7 | 16.9 | 13.2 | 0.25 |
| 940518 | 0100 | 1.13 | 0.162 | 0.171 | 6.19 | 5.83 | 38.0 | 40.0 | 42.8 | 18.3 | 16.9 | 11.2 | 0.23 |
| 940518 | 0400 | 0.98 | 0.171 | 0.181 | 5.83 | 5.52 | 38.0 | 40.0 | 39.1 | 17.6 | 14.4 | 12.3 | 0.16 |
| 940518 | 0700 | 1.16 | 0.171 | 0.171 | 5.83 | 5.83 | 28.0 | 38.0 | 35.2 | 17.5 | 15.6 | 11.9 | 0.17 |
| 940518 | 1000 | 1.01 | 0.171 | 0.181 | 5.83 | 5.52 | 20.0 | 20.0 | 30.0 | 20.7 | 16.8 | 14.6 | 0.18 |
| 940518 | 1600 | 1.16 | 0.103 | 0.103 | 9.71 | 9.71 | 10.0 | 10.0 | 15.5 | 24.1 | 20.4 | 20.3 | 0.14 |
| 940518 | 1900 | 1.24 | 0.113 | 0.103 | 8.87 | 9.71 | 6.0 | 8.0 | 12.3 | 22.2 | 19.6 | 19.6 | 0.13 |
| 940518 | 2200 | 1.18 | 0.103 | 0.103 | 9.71 | 9.71 | 2.0 | 6.0 | 11.4 | 23.7 | 21.6 | 19.3 | 0.18 |
| 940519 | 0100 | 1.11 | 0.103 | 0.103 | 9.71 | 9.71 | 8.0 | 12.0 | 23.0 | 30.9 | 21.1 | 14.0 | 0.22 |
| 940519 | 0400 | 1.23 | 0.210 | 0.220 | 4.75 | 4.54 | 38.0 | 34.0 | 24.8 | 30.4 | 19.5 | 15.8 | 0.18 |
| 940519 | 0700 | 1.36 | 0.132 | 0.220 | 7.56 | 4.54 | 10.0 | 14.0 | 28.1 | 32.1 | 22.9 | 21.8 | 0.15 |
| 940519 | 1000 | 1.66 | 0.171 | 0.191 | 5.83 | 5.24 | 14.0 | 12.0 | 19.0 | 27.8 | 21.2 | 19.0 | 0.16 |
| 940519 | 1300 | 1.91 | 0.103 | 0.103 | 9.71 | 9.71 | 2.0 | 6.0 | 20.1 | 28.8 | 21.1 | 15.9 | 0.16 |
| 940519 | 1600 | 1.96 | 0.162 | 0.142 | 6.19 | 7.04 | 14.0 | 12.0 | 22.1 | 26.5 | 20.7 | 18.2 | 0.16 |
| 940519 | 1900 | 1.87 | 0.103 | 0.132 | 9.71 | 7.56 | 0.0 | 14.0 | 18.7 | 24.8 | 20.3 | 14.4 | 0.13 |
| 940519 | 2200 | 2.07 | 0.152 | 0.142 | 6.59 | 7.04 | 18.0 | 14.0 | 20.1 | 25.1 | 20.6 | 16.3 | 0.15 |
| 940520 | 0100 | 1.95 | 0.113 | 0.113 | 8.87 | 8.87 | 4.0 | 14.0 | 23.3 | 29.0 | 20.9 | 13.9 | 0.19 |
| 940520 | 0400 | 1.92 | 0.103 | 0.103 | 9.71 | 9.71 | 2.0 | 14.0 | 20.7 | 27.8 | 20.7 | 15.8 | 0.17 |
| 940520 | 0700 | 2.03 | 0.103 | 0.103 | 9.71 | 9.71 | 6.0 | 14.0 | 21.9 | 25.3 | 20.8 | 14.0 | 0.16 |
| 940520 | 1000 | 2.13 | 0.152 | 0.152 | 6.59 | 6.59 | 18.0 | 16.0 | 24.4 | 27.2 | 22.6 | 17.1 | 0.17 |
| 940520 | 1300 | 2.28 | 0.152 | 0.152 | 6.59 | 6.59 | 14.0 | 14.0 | 22.9 | 27.8 | 21.8 | 18.2 | 0.18 |
| 940520 | 1600 | 2.03 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 12.0 | 24.5 | 33.4 | 22.4 | 17.1 | 0.20 |
| 940520 | 1900 | 1.91 | 0.103 | 0.103 | 9.71 | 9.71 | -2.0 | 14.0 | 21.5 | 31.8 | 22.6 | 17.9 | 0.17 |

## Table A1 (Continued)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940520 | 2200 | 2.03 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | 10.0 | 18.3 | 30.0 | 23.2 | 17.4 | 0.16 |
| 940521 | 0100 | 2.13 | 0.093 | 0.093 | 10.72 | 10.72 | 6.0 | 10.0 | 18.6 | 31.5 | 23.9 | 18.4 | 0.19 |
| 940521 | 0400 | 2.14 | 0.093 | 0.103 | 10.72 | 9.71 | -4.0 | 12.0 | 20.6 | 33.2 | 22.5 | 18.1 | 0.19 |
| 940521 | 0700 | 2.26 | 0.162 | 0.152 | 6.19 | 6.59 | 18.0 | 14.0 | 21.6 | 32.1 | 22.3 | 18.0 | 0.18 |
| 940521 | 1000 | 2.33 | 0.162 | 0.162 | 6.19 | 6.19 | 20.0 | 16.0 | 23.1 | 30.7 | 23.2 | 14.4 | 0.19 |
| 940521 | 1300 | 2.10 | 0.152 | 0.152 | 6.59 | 6.59 | 12.0 | 12.0 | 23.4 | 32.9 | 24.3 | 18.1 | 0.22 |
| 940521 | 1600 | 1.88 | 0.123 | 0.103 | 8.16 | 9.71 | 8.0 | 14.0 | 23.0 | 30.3 | 23.2 | 21.1 | 0.20 |
| 940521 | 1900 | 1.67 | 0.103 | 0.103 | 9.71 | 9.71 | 10.0 | 10.0 | 20.5 | 30.7 | 24.0 | 19.7 | 0.18 |
| 940521 | 2200 | 1.58 | 0.103 | 0.103 | 9.71 | 9.71 | 6.0 | 8.0 | 16.0 | 31.3 | 25.0 | 19.4 | 0.15 |
| 940522 | 0100 | 1.66 | 0.093 | 0.093 | 10.72 | 10.72 | 12.0 | 10.0 | 16.4 | 34.2 | 25.4 | 21.5 | 0.18 |
| 940522 | 0400 | 1.68 | 0.093 | 0.093 | 10.72 | 10.72 | 8.0 | 10.0 | 19.1 | 38.8 | 24.0 | 20.3 | 0.20 |
| 940522 | 0700 | 1.72 | 0.210 | 0.123 | 4.75 | 8.16 | 46.0 | 8.0 | 21.4 | 39.5 | 23.3 | 26.0 | 0.19 |
| 940522 | 1000 | 1.64 | 0.152 | 0.113 | 6.59 | 8.87 | 2.0 | 4.0 | 14.7 | 31.7 | 23.5 | 21.1 | 0.15 |
| 940522 | 1300 | 1.47 | 0.113 | 0.123 | 8.87 | 8.16 | 0.0 | 2.0 | 11.7 | 30.1 | 27.0 | 26.3 | 0.16 |
| 940522 | 1600 | 1.40 | 0.113 | 0.113 | 8.87 | 8.87 | 8.0 | 8.0 | 11.1 | 28.7 | 26.4 | 25.4 | 0.17 |
| 940522 | 1900 | 1.30 | 0.113 | 0.113 | 8.87 | 8.87 | -2.0 | 6.0 | 7.9 | 30.2 | 26.2 | 28.4 | 0.15 |
| 940522 | 2200 | 1.27 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 2.0 | 7.7 | 27.5 | 25.7 | 23.1 | 0.11 |
| 940523 | 0100 | 1.22 | 0.113 | 0.113 | 8.87 | 8.87 | 2.0 | 2.0 | 5.4 | 25.2 | 24.5 | 19.3 | 0.12 |
| 940523 | 0400 | 1.14 | 0.113 | 0.113 | 8.87 | 8.87 | 6.0 | 6.0 | 10.4 | 23.2 | 23.1 | 18.4 | 0.16 |
| 940523 | 0700 | 1.00 | 0.113 | 0.113 | 8.87 | 8.87 | 4.0 | 4.0 | 8.9 | 23.7 | 22.1 | 20.5 | 0.17 |
| 940523 | 1000 | 0.85 | 0.103 | 0.113 | 9.71 | 8.87 | 4.0 | 12.0 | 9.8 | 23.3 | 22.0 | 28.3 | 0.14 |
| 940523 | 1300 | 0.93 | 0.103 | 0.103 | 9.71 | 9.71 | 4.0 | 10.0 | 8.5 | 21.8 | 22.3 | 16.3 | 0.15 |
| 940523 | 1600 | 0.92 | 0.132 | 0.113 | 7.56 | 8.87 | 12.0 | 14.0 | 12.2 | 20.5 | 19.6 | 36.9 | 0.18 |
| 940523 | 1900 | 0.81 | 0.103 | 0.103 | 9.71 | 9.71 | 0.0 | 16.0 | 11.4 | 24.8 | 20.6 | 16.0 | 0.18 |
| 940523 | 2200 | 0.77 | 0.113 | 0.113 | 8.87 | 8.87 | -2.0 | 10.0 | 9.3 | 23.4 | 20.2 | 20.2 | 0.14 |
| 940524 | 0100 | 0.70 | 0.113 | 0.113 | 8.87 | 8.87 | 4.0 | 10.0 | 5.0 | 30.9 | 30.1 | 23.9 | 0.15 |
| 940524 | 0400 | 0.68 | 0.132 | 0.113 | 7.56 | 8.87 | 2.0 | 6.0 | -1.7 | 36.8 | 38.7 | 34.0 | 0.19 |
| 940524 | 1300 | 0.53 | 0.123 | 0.113 | 8.16 | 8.87 | -36.0 | 4.0 | -17.7 | 37.7 | 38.7 | 34.0 | 0.18 |
| 940524 | 1600 | 0.48 | 0.113 | 0.123 | 8.87 | 8.16 | 0.0 | 4.0 | -8.3 | 40.0 | 43.6 | 35.2 | 0.21 |
| 940524 | 1900 | 0.43 | 0.113 | 0.113 | 8.87 | 8.87 | 8.0 | 4.0 | -13.1 | 38.7 | 41.8 | 31.3 | 0.23 |
| 940524 | 2200 | 0.39 | 0.123 | 0.113 | 8.16 | 8.87 | 4.0 | -14.0 | -8.0 | 34.4 | 36.3 | 31.1 | 0.26 |
| 940525 | 0100 | 0.39 | 0.123 | 0.123 | 8.16 | 8.16 | 6.0 | 6.0 | -9.8 | 35.6 | 34.1 | 35.3 | 0.23 |
| 940525 | 0400 | 0.41 | 0.123 | 0.123 | 8.16 | 8.16 | 6.0 | 6.0 | -9.3 | 35.2 | 35.1 | 34.7 | 0.27 |
| 940525 | 0700 | 0.37 | 0.123 | 0.123 | 8.16 | 8.16 | -34.0 | 8.0 | -17.2 | 37.1 | 36.2 | 36.0 | 0.25 |
| 940525 | 1000 | 0.34 | 0.113 | 0.123 | 8.87 | 8.16 | 2.0 | 4.0 | -17.7 | 37.7 | 35.8 | 32.8 | 0.26 |
| 940525 | 1300 | 0.39 | 0.123 | 0.123 | 8.16 | 8.16 | -34.0 | -34.0 | -31.0 | 38.8 | 29.8 | 32.5 | 0.22 |
| 940525 | 1600 | 0.46 | 0.308 | 0.113 | 3.25 | 8.87 | -58.0 | -56.0 | -44.3 | 32.4 | 22.0 | 35.8 | 0.27 |
| 940525 | 1900 | 0.44 | 0.171 | 0.113 | 5.83 | 8.87 | -50.0 | -56.0 | -46.3 | 30.6 | 20.6 | 36.2 | 0.26 |
| 940525 | 2200 | 0.35 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -58.0 | -44.2 | 33.4 | 23.8 | 23.8 | 0.26 |
| 940526 | 0100 | 0.37 | 0.132 | 0.142 | 7.56 | 7.04 | -40.0 | -38.0 | -40.6 | 25.2 | 21.1 | 18.1 | 0.21 |
| 940526 | 0400 | 0.43 | 0.142 | 0.132 | 7.04 | 7.56 | -42.0 | -42.0 | -41.4 | 24.3 | 18.7 | 15.8 | 0.23 |
| 940526 | 0700 | 0.43 | 0.132 | 0.123 | 7.56 | 8.16 | -42.0 | -42.0 | -46.7 | 29.9 | 21.1 | 22.5 | 0.21 |
| 940526 | 1000 | 0.41 | 0.132 | 0.132 | 7.56 | 7.56 | -40.0 | -42.0 | -43.7 | 27.3 | 24.8 | 16.5 | 0.18 |
| 940526 | 1300 | 0.44 | 0.123 | 0.123 | 8.16 | 8.16 | -38.0 | -40.0 | -39.8 | 27.7 | 24.8 | 16.4 | 0.19 |
| 940526 | 1600 | 0.58 | 0.269 | 0.259 | 3.72 | 3.86 | -54.0 | -52.0 | -45.6 | 24.0 | 16.2 | 8.0 | 0.24 |
| 940526 | 1900 | 0.64 | 0.240 | 0.240 | 4.17 | 4.17 | -54.0 | -56.0 | -49.7 | 15.2 | 9.2 | 5.5 | 0.25 |
| 940526 | 2200 | 0.44 | 0.142 | 0.142 | 7.04 | 7.04 | -44.0 | -44.0 | -45.5 | 24.8 | 13.8 | 12.0 | 0.20 |
| 940527 | 0100 | 0.38 | 0.142 | 0.142 | 7.04 | 7.04 | -40.0 | -40.0 | -40.0 | 20.2 | 20.0 | 11.1 | 0.19 |
| 940527 | 0400 | 0.40 | 0.142 | 0.113 | 7.04 | 8.87 | -40.0 | -40.0 | -38.1 | 21.5 | 21.4 | 19.2 | 0.20 |
| 940527 | 0700 | 0.47 | 0.142 | 0.132 | 7.04 | 7.56 | -40.0 | -40.0 | 0.4 | 94.9 | 24.5 | 13.0 | 0.23 |
| 940527 | 1000 | 1.16 | 0.191 | 0.201 | 5.24 | 4.98 | 54.0 | 54.0 | 48.1 | 21.3 | 19.8 | 15.8 | 0.17 |
| 940527 | 1300 | 1.05 | 0.191 | 0.191 | 5.24 | 5.24 | 46.0 | 38.0 | 42.8 | 20.1 | 17.7 | 11.1 | 0.16 |
| 940527 | 1600 | 0.95 | 0.191 | 0.210 | 5.24 | 4.75 | 44.0 | 48.0 | 36.1 | 27.2 | 18.5 | 13.6 | 0.16 |
| 940527 | 1900 | 0.97 | 0.171 | 0.250 | 5.83 | 4.01 | 36.0 | 38.0 | 40.8 | 30.5 | 25.1 | 23.2 | 0.18 |
| 940527 | 2200 | 0.82 | 0.162 | 0.181 | 6.19 | 5.52 | 34.0 | 32.0 | 34.5 | 32.0 | 28.2 | 17.3 | 0.20 |
| 940528 | 0100 | 0.67 | 0.152 | 0.201 | 6.59 | 4.98 | 28.0 | 34.0 | 29.0 | 39.9 | 29.2 | 22.1 | 0.13 |
| 940528 | 0400 | 0.60 | 0.162 | 0.162 | 6.19 | 6.19 | 26.0 | 26.0 | 31.0 | 45.1 | 30.5 | 10.3 | 0.13 |

## Table A1 (Concluded)

| Date | Time EST | $H_{mo}$ m | $f_{p,FD}$ Hz | $f_{p,IFS}$ Hz | $T_{p,FD}$ sec | $T_{p,IFS}$ sec | $\theta_{p,FD}$ deg | $\theta_{p,IDS}$ deg | $\theta_{p,SW}$ deg | $\Delta\theta_{IDS}$ deg | $\Delta\theta_{SW}$ deg | $\Delta\theta_{FDP}$ deg | $\chi$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 940528 | 0700 | 0.55 | 0.171 | 0.171 | 5.83 | 5.83 | 26.0 | 26.0 | 26.0 | 46.0 | 34.3 | 7.9 | 0.15 |
| 940528 | 1000 | 0.50 | 0.171 | 0.191 | 5.83 | 5.24 | 26.0 | 30.0 | 18.6 | 54.9 | 32.1 | 19.9 | 0.16 |
| 940528 | 1300 | 0.47 | 0.191 | 0.191 | 5.24 | 5.24 | 30.0 | 32.0 | 14.5 | 54.9 | 28.4 | 9.1 | 0.19 |
| 940528 | 1600 | 0.47 | 0.191 | 0.132 | 5.24 | 7.56 | 32.0 | 32.0 | 9.7 | 53.5 | 33.8 | 25.6 | 0.15 |
| 940528 | 1900 | 0.46 | 0.142 | 0.142 | 7.04 | 7.04 | -38.0 | -14.0 | -1.5 | 39.7 | 37.4 | 28.4 | 0.15 |
| 940528 | 2200 | 0.44 | 0.162 | 0.132 | 6.19 | 7.56 | -12.0 | -12.0 | -7.7 | 32.5 | 35.0 | 25.5 | 0.17 |
| 940529 | 0100 | 0.39 | 0.132 | 0.142 | 7.56 | 7.04 | -18.0 | -16.0 | -17.2 | 31.0 | 33.3 | 25.5 | 0.18 |
| 940529 | 0400 | 0.39 | 0.132 | 0.132 | 7.56 | 7.56 | -18.0 | -34.0 | -21.8 | 32.0 | 34.1 | 24.6 | 0.16 |
| 940529 | 0700 | 0.39 | 0.142 | 0.142 | 7.04 | 7.04 | -16.0 | -20.0 | -20.5 | 35.8 | 36.5 | 28.9 | 0.18 |
| 940529 | 1000 | 0.37 | 0.142 | 0.162 | 7.04 | 6.19 | -38.0 | -36.0 | -23.6 | 39.2 | 40.0 | 28.3 | 0.18 |
| 940529 | 1300 | 0.34 | 0.123 | 0.123 | 8.16 | 8.16 | -34.0 | -32.0 | -17.2 | 36.0 | 36.7 | 33.0 | 0.20 |
| 940529 | 1600 | 0.34 | 0.132 | 0.123 | 7.56 | 8.16 | -36.0 | -34.0 | -23.4 | 33.8 | 33.7 | 33.6 | 0.19 |
| 940529 | 1900 | 0.34 | 0.142 | 0.132 | 7.04 | 7.56 | -36.0 | -36.0 | -25.7 | 33.5 | 32.2 | 33.0 | 0.22 |
| 940529 | 2200 | 0.34 | 0.142 | 0.142 | 7.04 | 7.04 | -36.0 | -32.0 | -27.5 | 34.6 | 31.7 | 29.3 | 0.21 |
| 940530 | 0100 | 0.35 | 0.142 | 0.142 | 7.04 | 7.04 | -36.0 | -34.0 | -33.9 | 38.3 | 30.2 | 37.2 | 0.22 |
| 940530 | 0400 | 0.38 | 0.240 | 0.103 | 4.17 | 9.71 | -54.0 | -54.0 | -32.4 | 44.0 | 29.0 | 26.8 | 0.17 |
| 940530 | 0700 | 0.40 | 0.240 | 0.132 | 4.17 | 7.56 | -52.0 | -38.0 | -34.4 | 37.1 | 28.7 | 29.7 | 0.18 |
| 940530 | 1000 | 0.48 | 0.201 | 0.230 | 4.98 | 4.35 | -52.0 | -50.0 | -40.7 | 31.1 | 25.5 | 21.2 | 0.19 |
| 940530 | 1300 | 0.54 | 0.162 | 0.201 | 6.19 | 4.98 | -40.0 | -40.0 | -36.8 | 21.8 | 20.8 | 18.4 | 0.16 |
| 940530 | 1600 | 0.59 | 0.142 | 0.152 | 7.04 | 6.59 | -38.0 | -38.0 | -38.6 | 19.2 | 19.3 | 15.2 | 0.15 |
| 940530 | 1900 | 0.66 | 0.152 | 0.152 | 6.59 | 6.59 | -40.0 | -42.0 | -41.9 | 20.2 | 19.9 | 18.1 | 0.17 |
| 940530 | 2200 | 0.68 | 0.191 | 0.142 | 5.24 | 7.04 | -46.0 | -42.0 | -40.6 | 21.1 | 18.9 | 15.6 | 0.18 |
| 940531 | 0100 | 0.65 | 0.152 | 0.152 | 6.59 | 6.59 | -40.0 | -40.0 | -42.4 | 20.7 | 20.5 | 15.2 | 0.16 |
| 940531 | 0400 | 0.68 | 0.162 | 0.162 | 6.19 | 6.19 | -40.0 | -38.0 | -39.2 | 19.4 | 19.6 | 12.7 | 0.13 |
| 940531 | 0700 | 0.66 | 0.162 | 0.162 | 6.19 | 6.19 | -38.0 | -36.0 | -38.1 | 20.5 | 20.5 | 11.8 | 0.14 |
| 940531 | 1000 | 0.68 | 0.152 | 0.152 | 6.59 | 6.59 | -40.0 | -40.0 | -38.1 | 23.6 | 22.9 | 15.9 | 0.17 |
| 940531 | 1300 | 0.61 | 0.152 | 0.152 | 6.59 | 6.59 | -40.0 | -38.0 | -38.8 | 26.3 | 24.4 | 17.3 | 0.19 |
| 940531 | 1600 | 0.61 | 0.162 | 0.152 | 6.19 | 6.59 | -38.0 | -38.0 | -38.3 | 19.8 | 18.9 | 14.4 | 0.16 |
| 940531 | 1900 | 0.73 | 0.171 | 0.162 | 5.83 | 6.19 | -42.0 | -36.0 | -39.4 | 19.1 | 17.7 | 15.4 | 0.14 |
| 940531 | 2200 | 0.73 | 0.181 | 0.181 | 5.52 | 5.52 | -44.0 | -42.0 | -40.7 | 21.9 | 20.8 | 15.0 | 0.17 |

# Appendix B
# Time Series Graphs of Bulk Parameters

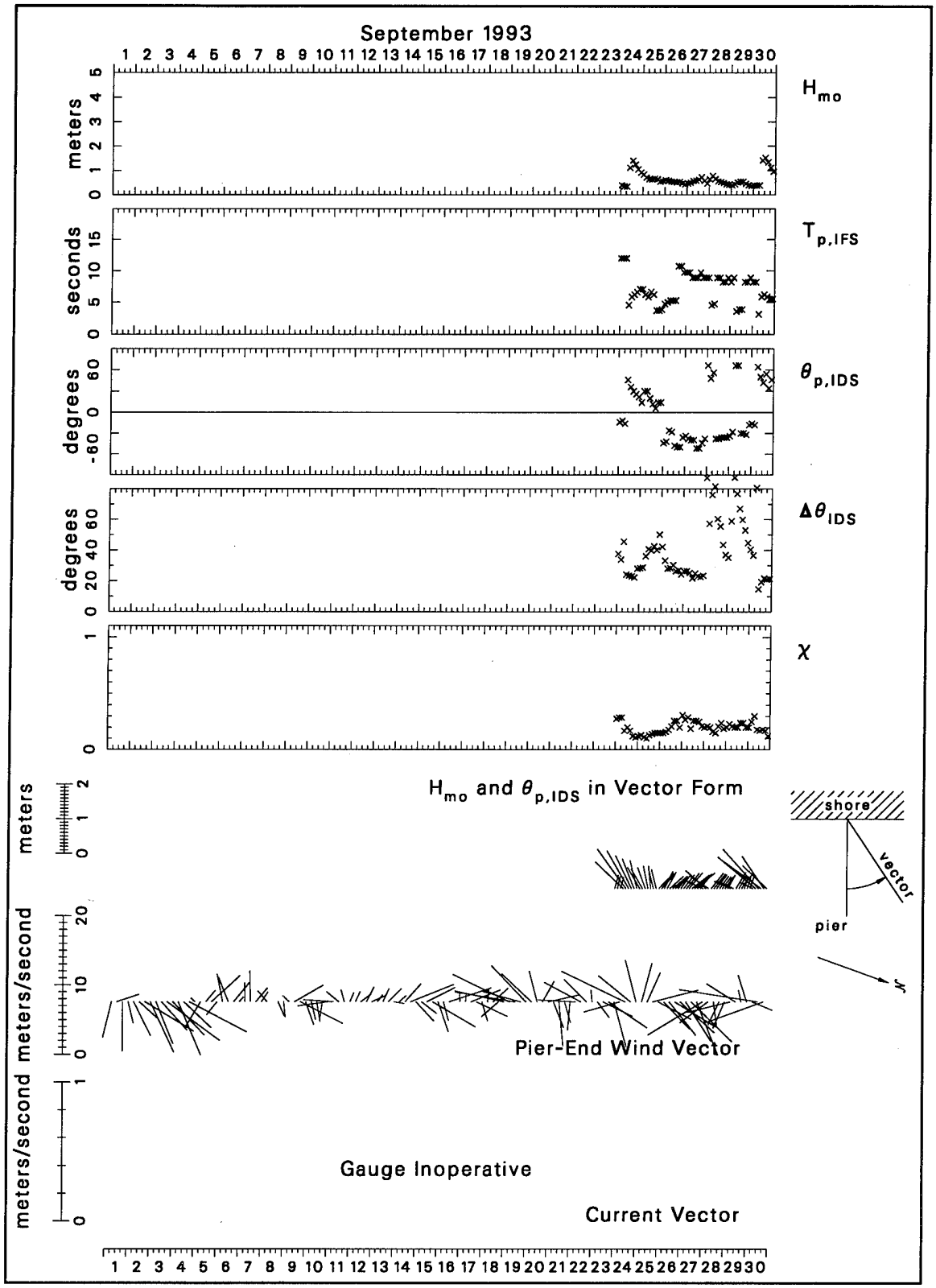



Figure B1. Bulk data for September 1993

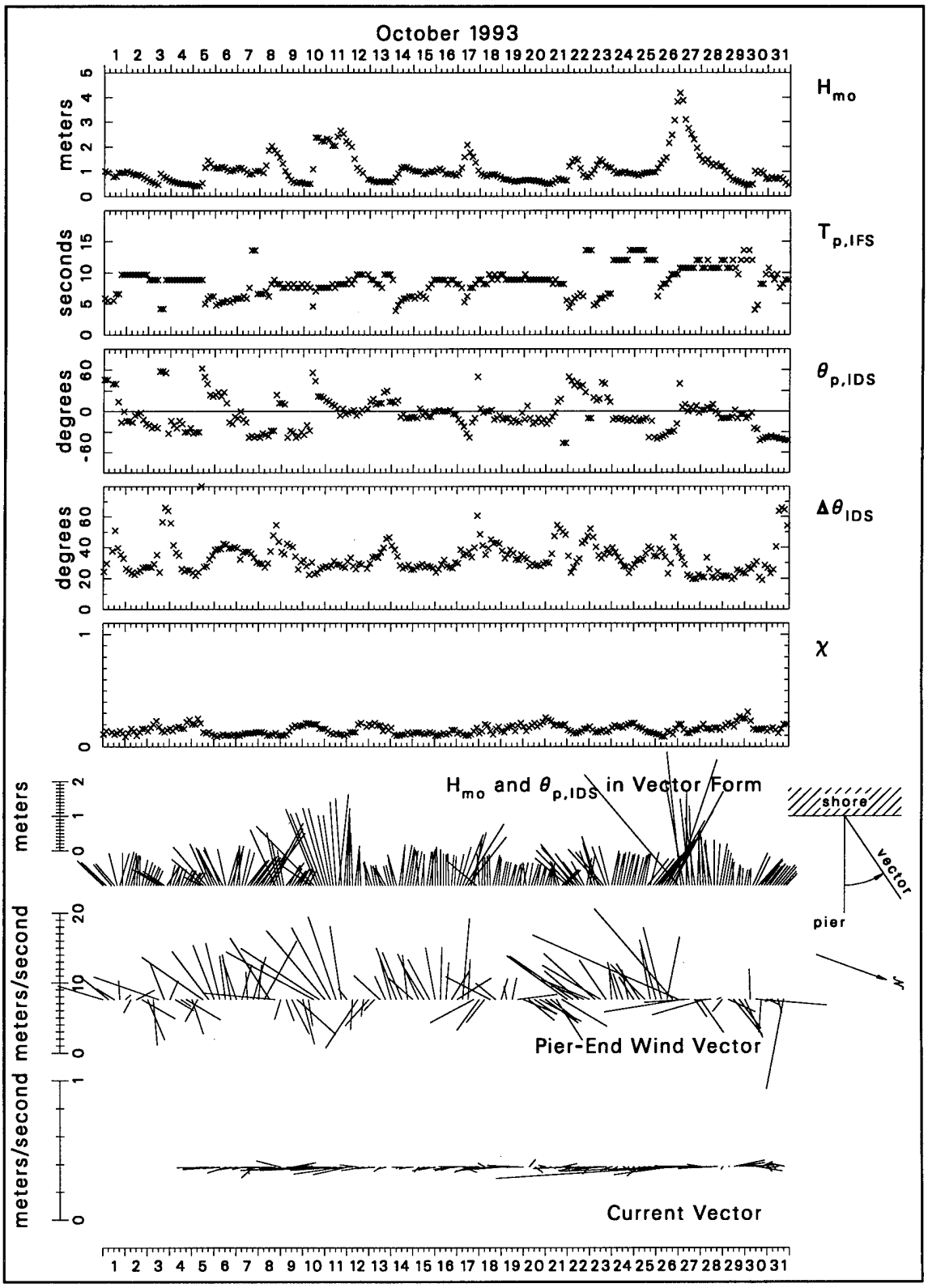



Figure B2. Bulk data for October 1993

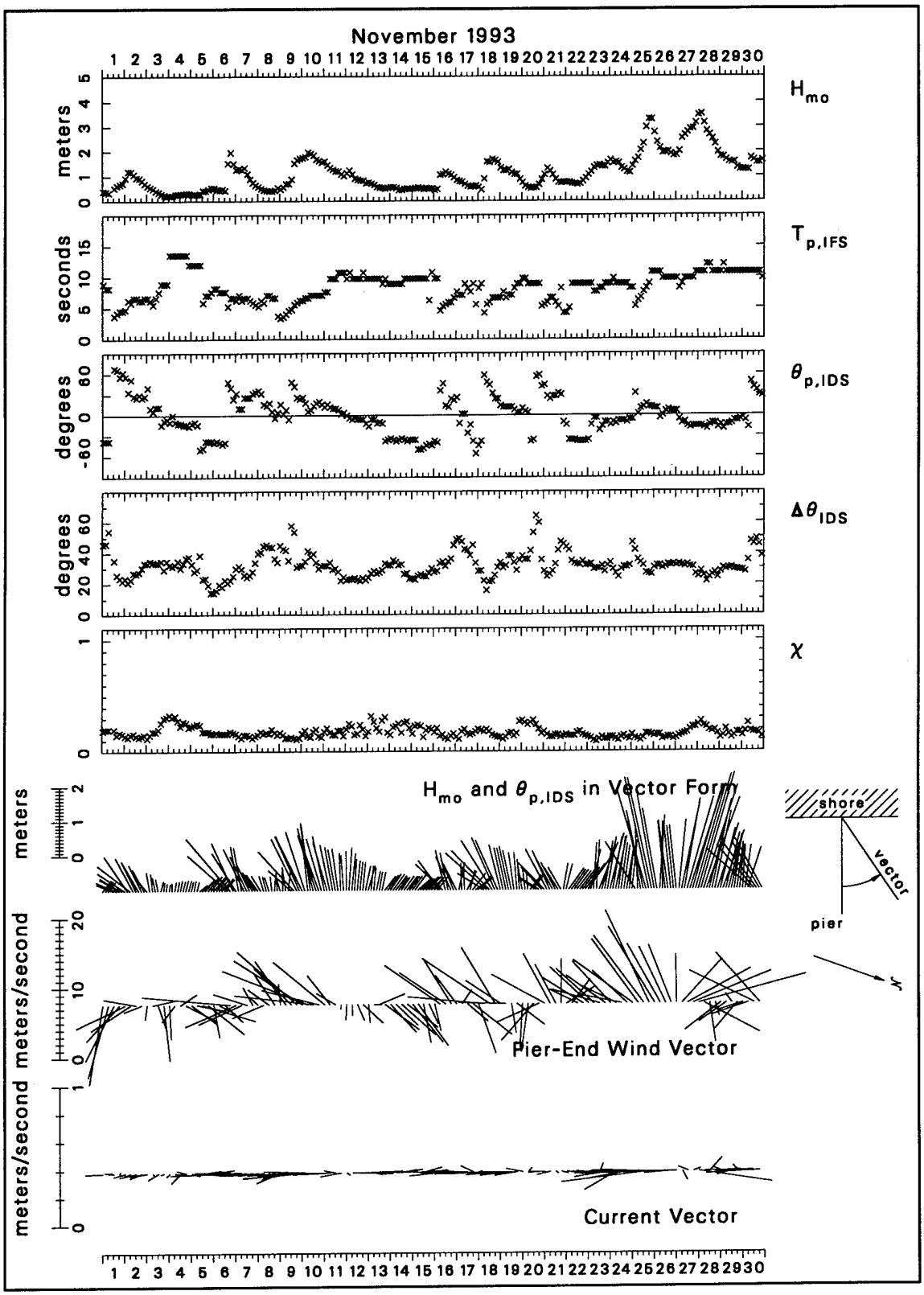



Figure B3. Bulk data for November 1993

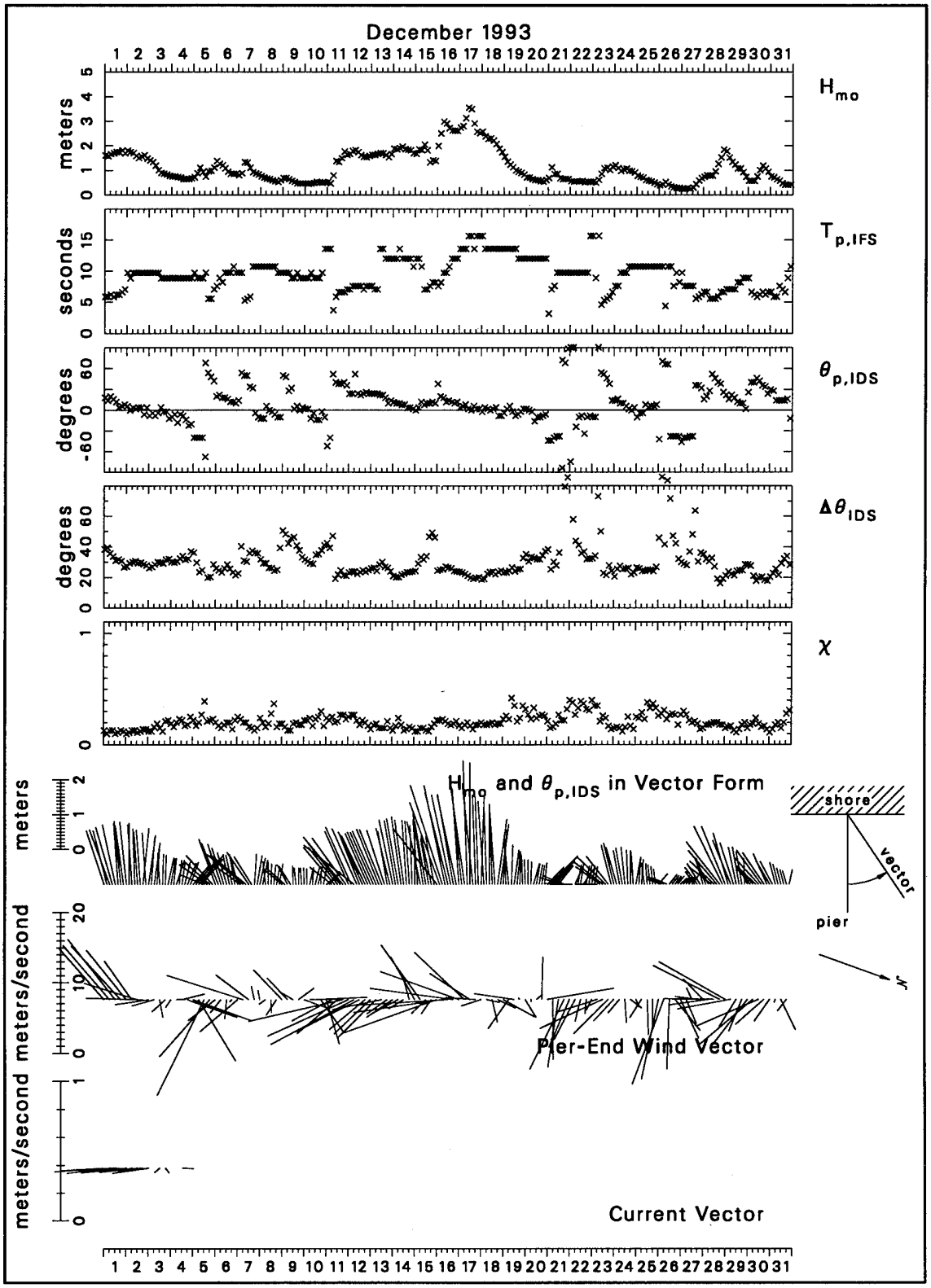



Figure B4. Bulk data for December 1993

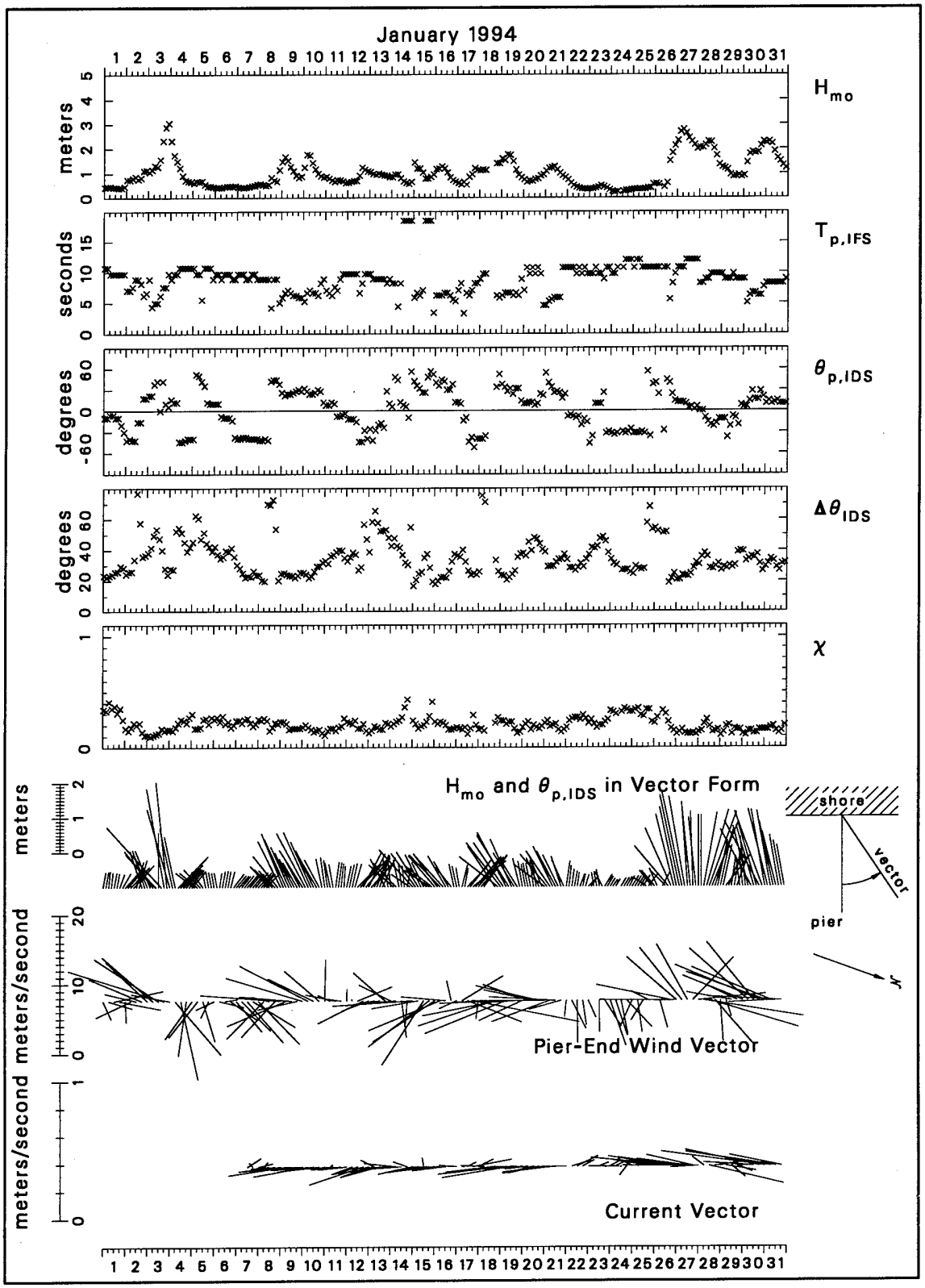



Figure B5. Bulk data for January 1994

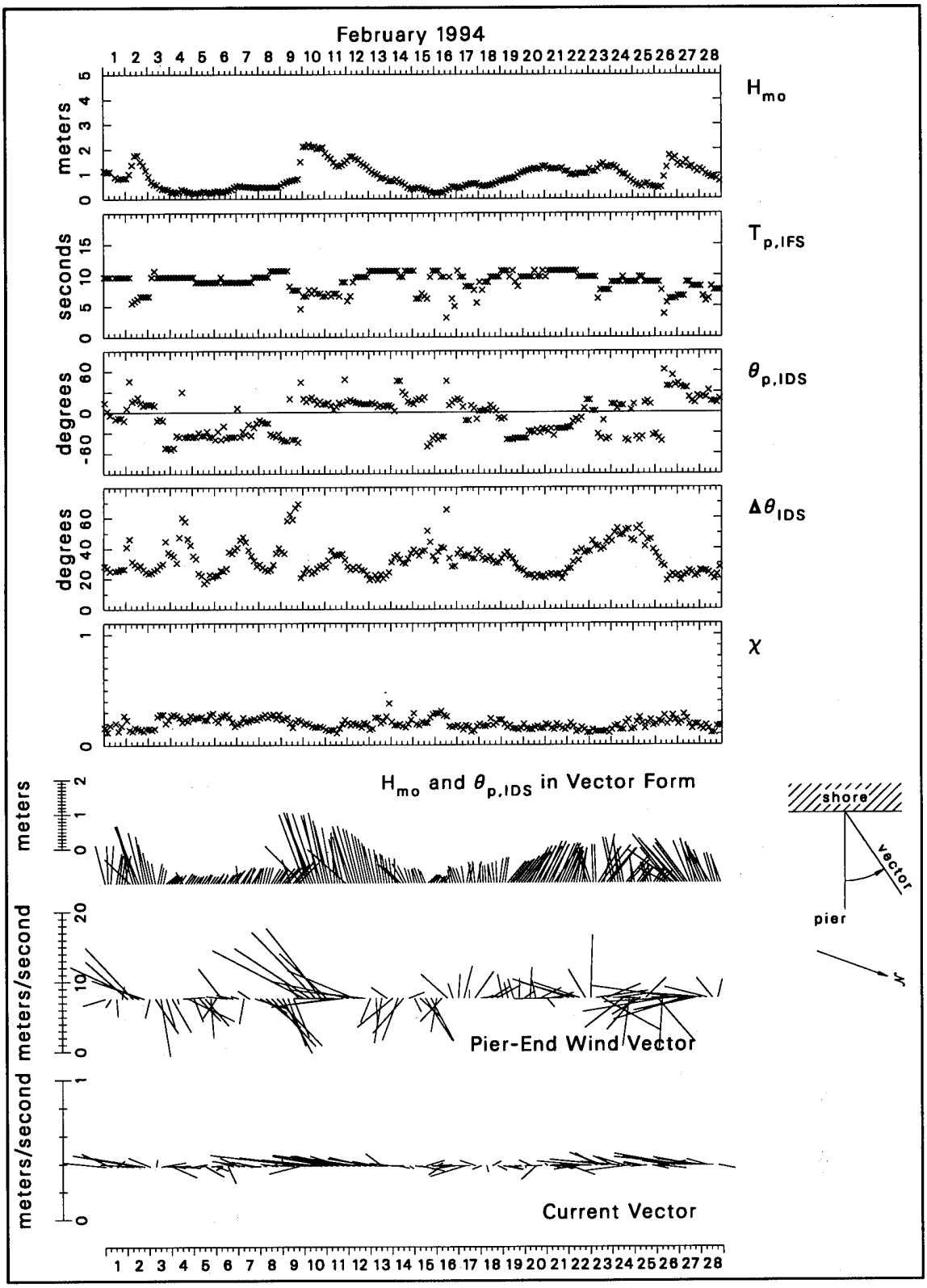



Figure B6. Bulk data for February 1994

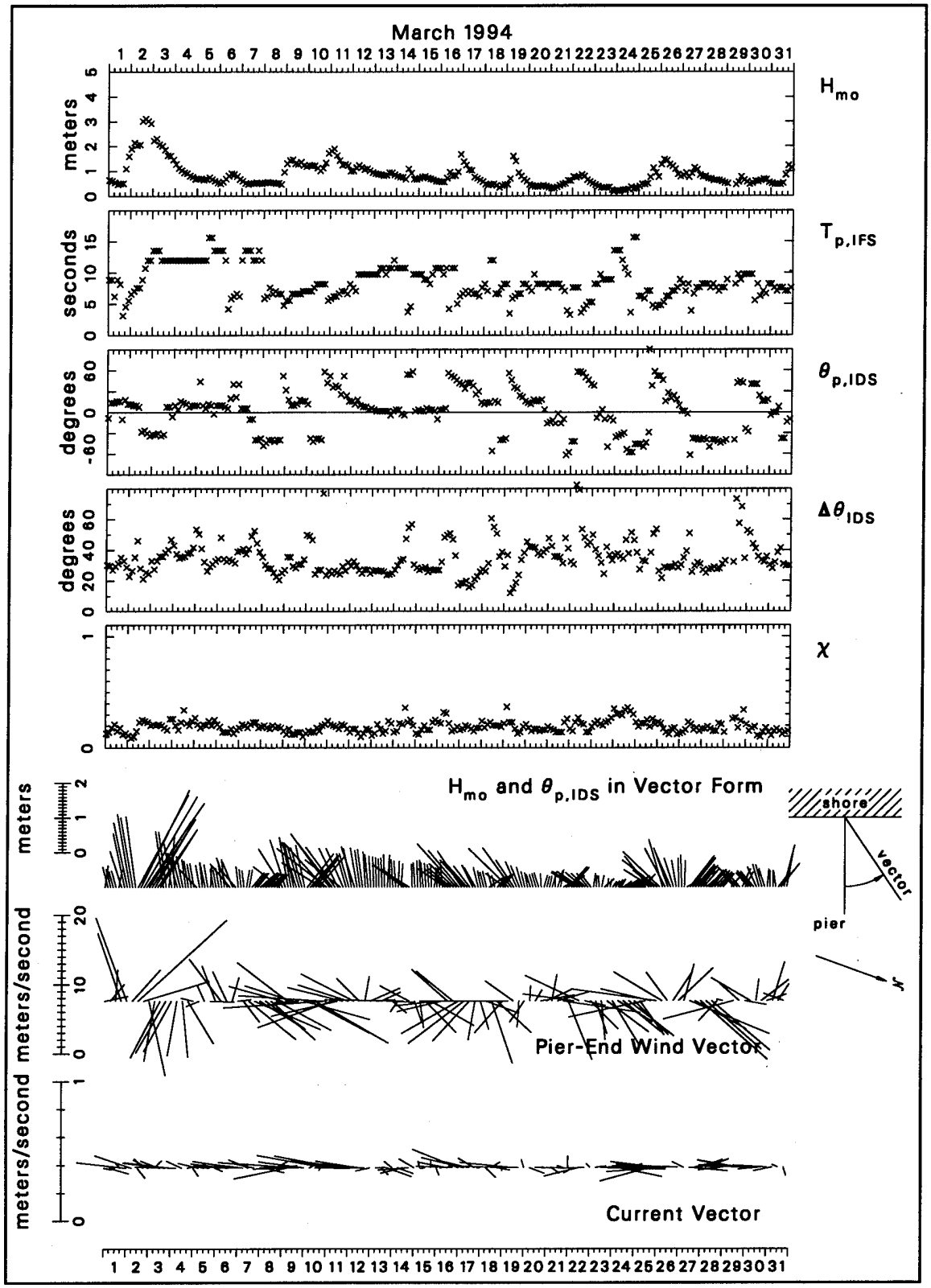



Figure B7. Bulk data for March 1994

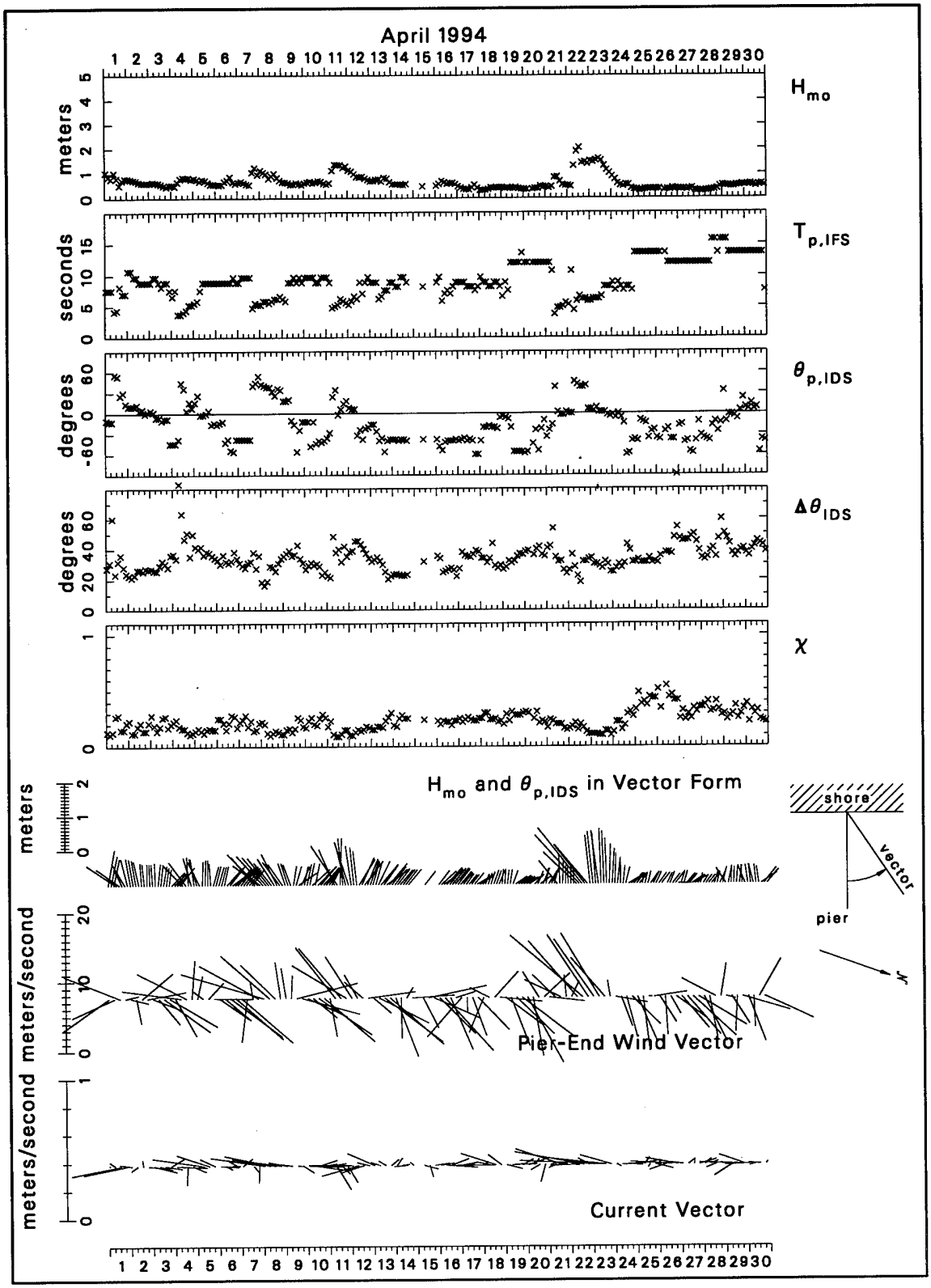



Figure B8. Bulk data for April 1994

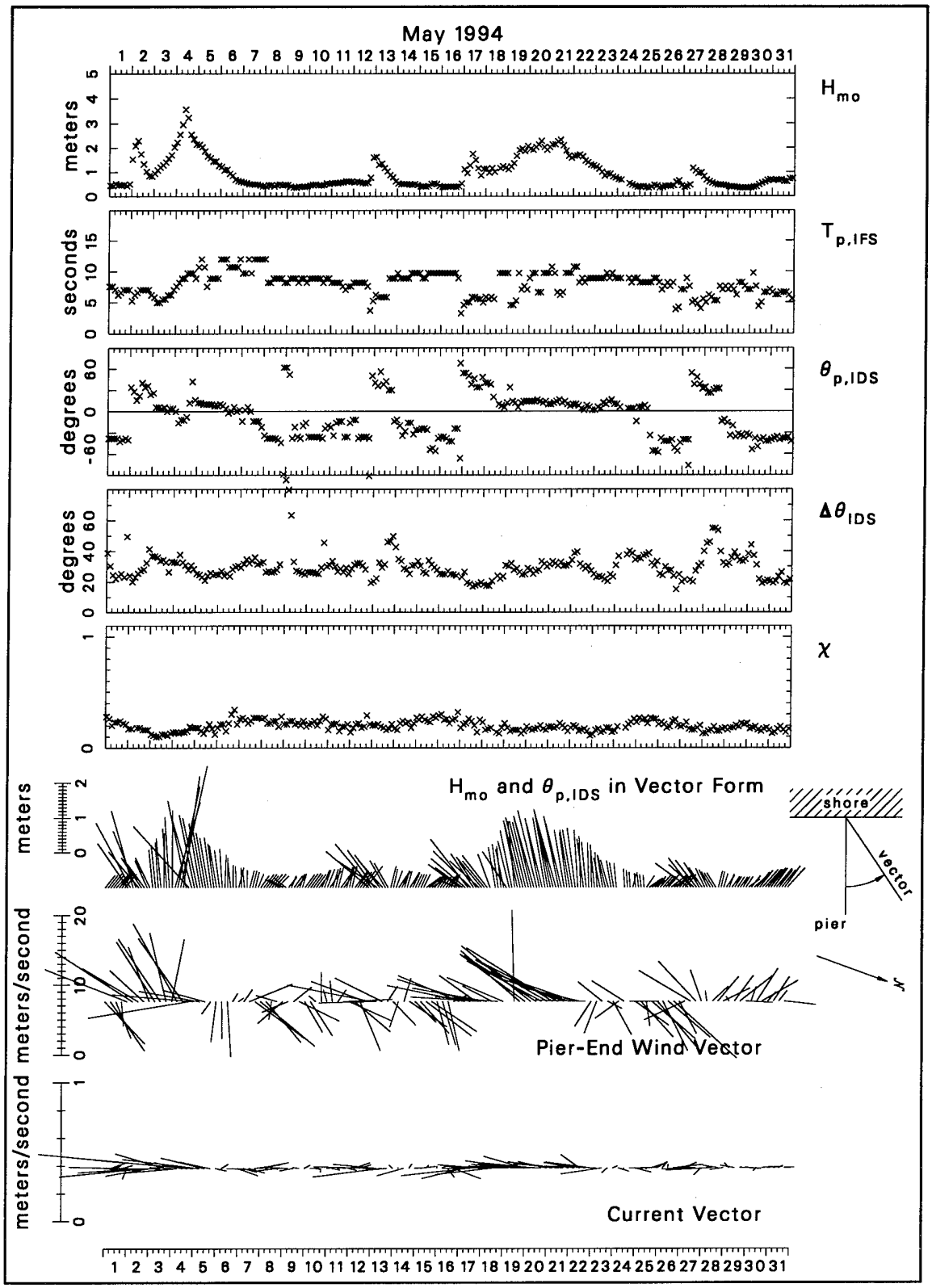



Figure B9. Bulk data for May 1994

# Appendix C
# Listing of FORTRAN Computer Program

```
      program readascii
c
c  This program has the codes to read FRF 8-m
c  array directional spectral ASCII output files.
c  This program simply reads the ASCII file and
c  writes an ASCII file as a test of the code.
c  You will have to tune the I/O statements to
c  your own system...
c
c  Variable names, units and meanings are:
c
c=====================================================================
c
c       datetime...[character*10] Date and Eastern Standard Time of
c                  beginning of data collection in the order year,
c                  month, day, hour, minute and in the form
c                  yymmddhhmm (2-digit year, no blanks in any field)
c            Hmo...[m] Energy-based characteristic wave height =
c                  4*sigma, where sigma^2 is the variance of sea
c                  surface displacement = volume under frequency-
c                  direction (f-d) spectrum
c             fp...[Hz] Frequency at the peak of the frequency spectrum
c            thp...[deg] Direction at the peak of the directional
c                  distribution at f=fp
c
c         ifimle...Algorithm flag: [1]=IMLE estimate, [0]=MLE estimate
c
c           istot...[sec] Length of time series processed
c            sfrq...[Hz] Data sampling frequency in time series
c
c        ifwindo...Windowing flag: [0]=data segments not windowed,
c                  [1]=data segments windowed (Kaiser-Bessel window)
c        ifdtrnd...Detrending flag: [0]=data segments not detrended,
c                  [1]=data segments detrended (linear trend removed)
c             nfft...Number of data points in a data segment
c           nensb...Number of half-lapped segments analyzed
c           nband...Number of frequency bands averaged for frequency
c                  smoothing
c           idgfr...Degrees of freedom of final frequency spectral
c                  estimates
c
c           nofrq...Number of output frequency bands
c           delfs...[Hz] Width of an output frequency band
c           noang...Number of output direction bins (arcs)
c        odelang...[deg] Width of an output direction bin
c
```

Figure C1. Listing of FORTRAN Computer Program (Sheet 1 of 3)

```
c          dmin...[m] Minimum water depth during time series at
c                 8-m array reference gage 'rname'
c          dbar...[m] Mean water depth during time series at
c                 reference gage
c          dmax...[m] Maximum water depth during time series at
c                 reference gage
c         rname...Reference gage ID (FRF gage name - get help if
c                 you need to know which 8-m array gage it was)
c
c           s9b...[m/sec] Mean wind speed at pier end anemometer
c                 (19.5 m above mean sea level) during time series
c           s9s...[m/sec] Standard deviation of wind speed at pier
c                 end anemometer
c           s9m...[m/sec] Maximum wind speed at pier end anemometer
c           d9b...[deg] Vector averaged mean wind direction at pier
c                 end anemometer - direction from which wind blows
c                 in wave direction coordinates (degrees counter-
c                 clockwise from shore normal)
c           d9s...[deg] Measure of variability of wind direction at pier
c                 end anemometer = arctangent[(standard deviation of
c                 cross-mean-streamline wind speed)/(mean wind speed)]
c
c           s6b...   These are the same as s9b, s9s, s9m, d9b,
c           s6s...      and d9s, except they are from the building
c           s6m...        anemometer at the landward end of the
c           d6b...          pier and 19.5 m above mean sea level
c           d6s...
c
c        oangle...[deg] Array of wave direction coordinates that
c                 aligns with the f-d spectral array
c
c           nof...(Within a loop) Frequency index
c       of(nof)...[Hz] Frequency
c      osf(nof)...[m^2/Hz] Frequency spectral density at frequency
c                 of(nof)
c    ogpat(nof)...[character*16] Encoded list of gages used to compute
c                 directional distribution of energy at this frequency
c    itero(nof)...Number of IMLE iterations used to compute directional
c                 distribution of energy at this frequency
c  ospc(nof,noa)...[1/deg] Normalized frequency-direction spectral den-
c                 sity at frequency of(nof) and direction oangle(noa).
c                 Dimensional frequency-direction spectrum spc(nof,noa)
c                 [in m^2/(Hz deg)] is found from:
c
c                        spc(nof,noa) = osf(nof)*ospc(nof,noa)
c
c=======================================================================
c
c  links:  none
c
      character*4               rname
      character*10             datetime
      character*16            ogpat(29)
      character*16               infile,        outfile
      dimension                  of(29),        osf(29),      itero(29)
      dimension              oangle(181),   ospc(29,181)
c
c  ask user for input and output file names
c
      write(*,'(2x,''Enter input file name...: '')')
      read(*,'(a)') infile
      write(*,'(2x,''Enter output file name...: '')')
      read(*,'(a)') outfile
c
c  open input file and read data
c
      open(10,file=infile,status='unknown',access='sequential',
     &  form='formatted')
c
      read(10,'(a10,f10.2,f10.5,f10.1,2i10,f10.2,i10)')
     &    datetime,      Hmo,       fp,      thp,
     &      ifimle,    istot,     sfrq,  ifwindo
```

Figure C1. (Sheet 2 of 3)

```
c
      read(10,'(6i10,f10.5,i10)')
     &       ifdtrnd,       nfft,      nensb,      nband,
     &         idgfr,      nofrq,      delfs,      noang
c
      read(10,'(4f10.2,6x,a4,3f10.2)')
     &       odelang,       dmin,       dbar,       dmax,
     &         rname,        s9b,        s9s,        s9m
c
      read(10,'(2f10.1,3f10.2,2f10.1)')
     &           d9b,        d9s,        s6b,        s6s,
     &           s6m,        d6b,        d6s
c
      read(10,'(10f8.1)') (oangle(noa),noa=1,noang)
c
      do 700 nof=1,nofrq
c
        read(10,'(i10,f10.5,e20.7,4x,a16,i10)')
     &          nof,    of(nof),   osf(nof), ogpat(nof),
     &    itero(nof)
c
        read(10,'(8f10.7)') (ospc(nof,noa),noa=1,noang)
c
700   continue
c
      close(10)
c
c  open output file and write variables just read
c
      open(11,file=outfile,status='unknown',access='sequential',
     &  form='formatted')
c
      write(11,'(a10,f10.2,f10.5,f10.1,2i10,f10.2,i10)')
     &    datetime,      Hmo,       fp,      thp,
     &      ifimle,    istot,     sfrq,  ifwindo
c
      write(11,'(6i10,f10.5,i10)')
     &       ifdtrnd,       nfft,      nensb,      nband,
     &         idgfr,      nofrq,      delfs,      noang
c
      write(11,'(4f10.2,6x,a4,3f10.2)')
     &       odelang,       dmin,       dbar,       dmax,
     &         rname,        s9b,        s9s,        s9m
c
      write(11,'(2f10.1,3f10.2,2f10.1)')
     &           d9b,        d9s,        s6b,        s6s,
     &           s6m,        d6b,        d6s
c
      write(11,'(10f8.1)') (oangle(noa),noa=1,noang)
c
      do 800 nof=1,nofrq
c
        write(11,'(i10,f10.5,e20.7,4x,a16,i10)')
     &          nof,    of(nof),   osf(nof), ogpat(nof),
     &    itero(nof)
c
        write(11,'(8f10.7)') (ospc(nof,noa),noa=1,noang)
c
800   continue
c
      close(11)
c
      end
```

Figure C1. (Sheet 3 of 3)

# Appendix D
# Listing of Sample Data File

```
9310210100      0.50   0.11279     -24.0         1      8192      2.00         1
         0      2048        15        10       160        29   0.00977        91
      2.00      8.11      8.32      8.49       191      5.57      0.67      8.14
    -125.0       6.1      3.50      0.86      6.89    -115.8      12.2
   -90.0   -88.0   -86.0   -84.0   -82.0   -80.0   -78.0   -76.0   -74.0   -72.0
   -70.0   -68.0   -66.0   -64.0   -62.0   -60.0   -58.0   -56.0   -54.0   -52.0
   -50.0   -48.0   -46.0   -44.0   -42.0   -40.0   -38.0   -36.0   -34.0   -32.0
   -30.0   -28.0   -26.0   -24.0   -22.0   -20.0   -18.0   -16.0   -14.0   -12.0
   -10.0    -8.0    -6.0    -4.0    -2.0     0.0     2.0     4.0     6.0     8.0
    10.0    12.0    14.0    16.0    18.0    20.0    22.0    24.0    26.0    28.0
    30.0    32.0    34.0    36.0    38.0    40.0    42.0    44.0    46.0    48.0
    50.0    52.0    54.0    56.0    58.0    60.0    62.0    64.0    66.0    68.0
    70.0    72.0    74.0    76.0    78.0    80.0    82.0    84.0    86.0    88.0
    90.0
         1   0.04443       0.5187181E-02    72456                      30
 0.0080223 0.0079863 0.0077956 0.0074416 0.0069404 0.0063168 0.0056052 0.0048449
 0.0040809 0.0033585 0.0027167 0.0021847 0.0017776 0.0015008 0.0013529 0.0013378
 0.0014720 0.0017933 0.0023609 0.0032392 0.0044605 0.0059871 0.0076797 0.0093173
 0.0106595 0.0115205 0.0118028 0.0115302 0.0108120 0.0098167 0.0087257 0.0077018
 0.0068727 0.0063295 0.0061365 0.0063464 0.0070068 0.0081402 0.0096908 0.0114591
 0.0130884 0.0141534 0.0143316 0.0135475 0.0119915 0.0100130 0.0079728 0.0061370
 0.0046425 0.0035176 0.0027256 0.0022051 0.0018971 0.0017576 0.0017621 0.0019039
 0.0021918 0.0026444 0.0032817 0.0041129 0.0051196 0.0062381 0.0073486 0.0082799
 0.0088359 0.0088568 0.0082818 0.0071938 0.0058107 0.0044002 0.0031822 0.0022647
 0.0016485 0.0012774 0.0010851 0.0010221 0.0010585 0.0011789 0.0013755 0.0016424
 0.0019708 0.0023479 0.0027566 0.0031781 0.0035930 0.0039820 0.0043300 0.0046230
 0.0048511 0.0050069 0.0050758
         2   0.05420       0.2076107E-01    72456                      30
 0.0031912 0.0031914 0.0031647 0.0031059 0.0030152 0.0028934 0.0027425 0.0025651
 0.0023659 0.0021514 0.0019297 0.0017109 0.0015054 0.0013238 0.0011754 0.0010683
 0.0010092 0.0010054 0.0010667 0.0012075 0.0014478 0.0018126 0.0023278 0.0030148
 0.0038844 0.0049337 0.0061438 0.0074843 0.0089155 0.0103934 0.0118725 0.0133104
 0.0146768 0.0159639 0.0171941 0.0184088 0.0196250 0.0207670 0.0216319 0.0219489
 0.0215176 0.0203198 0.0185205 0.0163840 0.0141771 0.0121106 0.0103196 0.0088696
 0.0077715 0.0069987 0.0065011 0.0062147 0.0060681 0.0059884 0.0059077 0.0057713
 0.0055443 0.0052138 0.0047860 0.0042819 0.0037305 0.0031639 0.0026128 0.0021033
 0.0016550 0.0012794 0.0009799 0.0007525 0.0005888 0.0004779 0.0004091 0.0003741
 0.0003671 0.0003849 0.0004262 0.0004907 0.0005780 0.0006870 0.0008151 0.0009580
 0.0011104 0.0012666 0.0014207 0.0015675 0.0017028 0.0018231 0.0019260 0.0020100
 0.0020740 0.0021173 0.0021368
         3   0.06396       0.1008572E+00    72456                      16
 0.0005109 0.0005114 0.0005131 0.0005157 0.0005194 0.0005240 0.0005294 0.0005356
 0.0005424 0.0005497 0.0005574 0.0005652 0.0005733 0.0005816 0.0005903 0.0006002
 0.0006124 0.0006285 0.0006512 0.0006841 0.0007320 0.0008013 0.0009000 0.0010388
 0.0012317 0.0014973 0.0018612 0.0023600 0.0030463 0.0039979 0.0053295 0.0072060
 0.0098486 0.0135060 0.0183326 0.0241084 0.0298900 0.0340718 0.0353239 0.0336834
 0.0304031 0.0268391 0.0237482 0.0213166 0.0194270 0.0178545 0.0163713 0.0148106
 0.0131098 0.0113159 0.0095441 0.0079135 0.0065008 0.0053308 0.0043892 0.0036427
 0.0030531 0.0025852 0.0022099 0.0019045 0.0016520 0.0014402 0.0012606 0.0011078
```

Figure D1. Listing of sample data file (Sheet 1 of 6)

```
0.0009780 0.0008689 0.0007784 0.0007042 0.0006441 0.0005954 0.0005556 0.0005227
0.0004946 0.0004702 0.0004486 0.0004290 0.0004112 0.0003950 0.0003803 0.0003670
0.0003550 0.0003444 0.0003350 0.0003268 0.0003199 0.0003141 0.0003095 0.0003059
0.0003034 0.0003020 0.0003016
         4    0.07373        0.5252190E-01     72456                    20
0.0004164 0.0004181 0.0004227 0.0004303 0.0004412 0.0004556 0.0004737 0.0004961
0.0005232 0.0005556 0.0005941 0.0006393 0.0006922 0.0007534 0.0008239 0.0009042
0.0009947 0.0010953 0.0012057 0.0013255 0.0014547 0.0015945 0.0017483 0.0019231
0.0021311 0.0023910 0.0027315 0.0031953 0.0038479 0.0047902 0.0061794 0.0082530
0.0113381 0.0157830 0.0216811 0.0283132 0.0337551 0.0357327 0.0335913 0.0289003
0.0238384 0.0197135 0.0168687 0.0151712 0.0143587 0.0141524 0.0142521 0.0143222
0.0140391 0.0132030 0.0118299 0.0101258 0.0083590 0.0067389 0.0053715 0.0042776
0.0034305 0.0027865 0.0023015 0.0019378 0.0016657 0.0014624 0.0013102 0.0011954
0.0011068 0.0010354 0.0009741 0.0009176 0.0008627 0.0008080 0.0007534 0.0006995
0.0006476 0.0005986 0.0005533 0.0005121 0.0004752 0.0004426 0.0004140 0.0003892
0.0003677 0.0003494 0.0003339 0.0003208 0.0003100 0.0003012 0.0002943 0.0002891
0.0002855 0.0002834 0.0002829
         5    0.08350        0.5383088E-01     72456                    10
0.0004612 0.0004616 0.0004627 0.0004645 0.0004670 0.0004703 0.0004744 0.0004796
0.0004861 0.0004942 0.0005044 0.0005175 0.0005344 0.0005567 0.0005864 0.0006263
0.0006804 0.0007545 0.0008566 0.0009984 0.0011958 0.0014713 0.0018547 0.0023840
0.0031039 0.0040606 0.0052926 0.0068172 0.0086185 0.0106423 0.0128038 0.0150029
0.0171345 0.0190828 0.0207085 0.0218559 0.0223971 0.0222962 0.0216436 0.0206320
0.0194918 0.0184273 0.0175752 0.0169839 0.0166012 0.0162768 0.0157999 0.0149867
0.0137765 0.0122621 0.0106290 0.0090605 0.0076775 0.0065305 0.0056191 0.0049160
0.0043824 0.0039771 0.0036585 0.0033872 0.0031282 0.0028567 0.0025628 0.0022518
0.0019402 0.0016467 0.0013858 0.0011650 0.0009850 0.0008423 0.0007313 0.0006461
0.0005813 0.0005321 0.0004949 0.0004666 0.0004450 0.0004283 0.0004152 0.0004049
0.0003965 0.0003896 0.0003838 0.0003789 0.0003749 0.0003715 0.0003687 0.0003666
0.0003651 0.0003642 0.0003639
         6    0.09326        0.8928818E-01     72456                    10
0.0003607 0.0003614 0.0003635 0.0003672 0.0003723 0.0003789 0.0003871 0.0003968
0.0004083 0.0004215 0.0004369 0.0004550 0.0004763 0.0005021 0.0005341 0.0005747
0.0006276 0.0006983 0.0007950 0.0009298 0.0011211 0.0013967 0.0017978 0.0023842
0.0032370 0.0044521 0.0061153 0.0082463 0.0107279 0.0132814 0.0155611 0.0173395
0.0186214 0.0195793 0.0203874 0.0210934 0.0215924 0.0216969 0.0212637 0.0203043
0.0190014 0.0176243 0.0164127 0.0155018 0.0149041 0.0145262 0.0142066 0.0137733
0.0131117 0.0122117 0.0111609 0.0100906 0.0091132 0.0082840 0.0075933 0.0069773
0.0063438 0.0056148 0.0047712 0.0038677 0.0030002 0.0022512 0.0016586 0.0012187
0.0009054 0.0006873 0.0005368 0.0004330 0.0003609 0.0003102 0.0002742 0.0002482
0.0002289 0.0002144 0.0002030 0.0001938 0.0001860 0.0001793 0.0001734 0.0001680
0.0001632 0.0001588 0.0001548 0.0001512 0.0001482 0.0001455 0.0001434 0.0001417
0.0001405 0.0001397 0.0001395
         7    0.10303        0.1565127E+00     72456                    30
0.0001688 0.0001685 0.0001676 0.0001662 0.0001642 0.0001617 0.0001588 0.0001556
0.0001522 0.0001490 0.0001462 0.0001443 0.0001439 0.0001458 0.0001509 0.0001608
0.0001777 0.0002050 0.0002486 0.0003182 0.0004308 0.0006158 0.0009239 0.0014378
0.0022781 0.0035808 0.0054072 0.0075900 0.0096709 0.0111680 0.0120290 0.0127421
0.0140275 0.0165444 0.0206903 0.0261332 0.0311367 0.0330241 0.0306243 0.0256582
0.0207334 0.0172223 0.0152694 0.0145478 0.0146555 0.0151750 0.0156612 0.0157218
0.0151780 0.0141279 0.0128045 0.0113772 0.0098870 0.0083184 0.0066974 0.0051287
0.0037519 0.0026643 0.0018825 0.0013596 0.0010256 0.0008170 0.0006872 0.0006044
0.0005480 0.0005048 0.0004664 0.0004283 0.0003889 0.0003487 0.0003091 0.0002719
0.0002384 0.0002092 0.0001845 0.0001641 0.0001476 0.0001344 0.0001240 0.0001158
0.0001094 0.0001044 0.0001007 0.0000978 0.0000957 0.0000941 0.0000929 0.0000921
0.0000916 0.0000913 0.0000912
         8    0.11279        0.2396767E+00     72456                    13
0.0001709 0.0001713 0.0001721 0.0001734 0.0001753 0.0001777 0.0001809 0.0001850
0.0001903 0.0001971 0.0002059 0.0002176 0.0002333 0.0002543 0.0002830 0.0003226
0.0003779 0.0004559 0.0005674 0.0007287 0.0009641 0.0013101 0.0018197 0.0025669
0.0036484 0.0051768 0.0072593 0.0099556 0.0132207 0.0168486 0.0204452 0.0234639
0.0253518 0.0257983 0.0249278 0.0232377 0.0213302 0.0196687 0.0184889 0.0178178
0.0175153 0.0173133 0.0168898 0.0160075 0.0146474 0.0130150 0.0114019 0.0100351
0.0090189 0.0083568 0.0079922 0.0078350 0.0077726 0.0076785 0.0074327 0.0069535
0.0062280 0.0053186 0.0043354 0.0033924 0.0025711 0.0019078 0.0014018 0.0010308
0.0007659 0.0005792 0.0004484 0.0003564 0.0002915 0.0002451 0.0002117 0.0001874
0.0001694 0.0001559 0.0001456 0.0001375 0.0001310 0.0001256 0.0001211 0.0001171
0.0001136 0.0001106 0.0001078 0.0001054 0.0001033 0.0001015 0.0001001 0.0000990
0.0000982 0.0000977 0.0000976
         9    0.12256        0.1500162E+00     72456                    30
0.0001678 0.0001680 0.0001685 0.0001694 0.0001707 0.0001726 0.0001753 0.0001789
0.0001839 0.0001907 0.0002000 0.0002128 0.0002305 0.0002552 0.0002898 0.0003391
```

Figure D1. (Sheet 2 of 6)

```
0.0004101 0.0005141 0.0006695 0.0009058 0.0012703 0.0018358 0.0027040 0.0039895
0.0057602 0.0079311 0.0102031 0.0122121 0.0138580 0.0154805 0.0176925 0.0210200
0.0253615 0.0293027 0.0304312 0.0276855 0.0227801 0.0181900 0.0151363 0.0137279
0.0137000 0.0146709 0.0159759 0.0165630 0.0155786 0.0132606 0.0106994 0.0087661
0.0077249 0.0075125 0.0079669 0.0087917 0.0094238 0.0091990 0.0079348 0.0061493
0.0044941 0.0032654 0.0024482 0.0019249 0.0015853 0.0013516 0.0011743 0.0010247
0.0008889 0.0007628 0.0006475 0.0005450 0.0004568 0.0003829 0.0003222 0.0002731
0.0002337 0.0002022 0.0001771 0.0001572 0.0001414 0.0001290 0.0001192 0.0001115
0.0001055 0.0001009 0.0000973 0.0000946 0.0000926 0.0000912 0.0000901 0.0000894
0.0000889 0.0000887 0.0000886
      10    0.13232       0.9761900E-01    72456                  12
0.0003192 0.0003200 0.0003219 0.0003249 0.0003289 0.0003337 0.0003391 0.0003451
0.0003514 0.0003582 0.0003659 0.0003754 0.0003881 0.0004064 0.0004340 0.0004761
0.0005411 0.0006413 0.0007972 0.0010418 0.0014289 0.0020428 0.0030023 0.0044379
0.0064067 0.0087454 0.0110164 0.0127702 0.0139620 0.0150042 0.0163973 0.0183133
0.0203039 0.0213486 0.0206431 0.0185220 0.0161598 0.0145299 0.0140004 0.0144964
0.0155897 0.0164680 0.0162713 0.0148734 0.0130538 0.0117051 0.0112429 0.0116289
0.0124690 0.0130438 0.0126625 0.0113120 0.0096804 0.0084480 0.0078601 0.0077935
0.0078688 0.0075541 0.0065032 0.0049219 0.0033624 0.0021925 0.0014497 0.0010183
0.0007789 0.0006509 0.0005867 0.0005578 0.0005456 0.0005363 0.0005204 0.0004929
0.0004541 0.0004079 0.0003598 0.0003146 0.0002751 0.0002425 0.0002167 0.0001969
0.0001822 0.0001715 0.0001639 0.0001587 0.0001553 0.0001532 0.0001520 0.0001514
0.0001511 0.0001510 0.0001511
      11    0.14209       0.6770834E-01    23456                   6
0.0002888 0.0002907 0.0002945 0.0003000 0.0003071 0.0003163 0.0003276 0.0003415
0.0003583 0.0003787 0.0004032 0.0004330 0.0004691 0.0005133 0.0005677 0.0006356
0.0007209 0.0008297 0.0009703 0.0011543 0.0013987 0.0017267 0.0021708 0.0027738
0.0035891 0.0046766 0.0060910 0.0078609 0.0099596 0.0122784 0.0146209 0.0167352
0.0183825 0.0194102 0.0197927 0.0196219 0.0190582 0.0182747 0.0174155 0.0165789
0.0158210 0.0151676 0.0146250 0.0141871 0.0138391 0.0135594 0.0133205 0.0130907
0.0128375 0.0125307 0.0121456 0.0116662 0.0110858 0.0104077 0.0096432 0.0088100
0.0079294 0.0070254 0.0061236 0.0052505 0.0044315 0.0036879 0.0030348 0.0024788
0.0020185 0.0016462 0.0013506 0.0011185 0.0009376 0.0007967 0.0006867 0.0006003
0.0005320 0.0004775 0.0004337 0.0003982 0.0003691 0.0003452 0.0003255 0.0003092
0.0002957 0.0002845 0.0002754 0.0002679 0.0002619 0.0002573 0.0002539 0.0002515
0.0002503 0.0002500 0.0002504
      12    0.15186       0.5220933E-01    23456                  30
0.0003065 0.0003086 0.0003128 0.0003188 0.0003267 0.0003368 0.0003492 0.0003643
0.0003825 0.0004044 0.0004305 0.0004618 0.0004992 0.0005443 0.0005987 0.0006649
0.0007461 0.0008467 0.0009730 0.0011339 0.0013422 0.0016168 0.0019853 0.0024884
0.0031846 0.0041545 0.0055003 0.0073274 0.0096931 0.0125065 0.0154127 0.0177775
0.0189167 0.0185061 0.0168168 0.0145212 0.0122814 0.0104983 0.0093183 0.0087542
0.0087933 0.0094557 0.0108070 0.0129222 0.0157724 0.0190170 0.0218235 0.0230607
0.0220439 0.0191741 0.0156168 0.0124130 0.0100294 0.0084913 0.0076549 0.0073628
0.0074786 0.0078575 0.0082979 0.0085242 0.0082641 0.0074088 0.0061102 0.0046824
0.0034030 0.0024028 0.0016850 0.0011939 0.0008646 0.0006442 0.0004952 0.0003930
0.0003215 0.0002705 0.0002334 0.0002061 0.0001857 0.0001703 0.0001585 0.0001495
0.0001426 0.0001373 0.0001332 0.0001302 0.0001279 0.0001263 0.0001251 0.0001244
0.0001241 0.0001240 0.0001242
      13    0.16162       0.3928215E-01    23456                  10
0.0003180 0.0003206 0.0003260 0.0003339 0.0003446 0.0003585 0.0003761 0.0003982
0.0004258 0.0004601 0.0005028 0.0005563 0.0006235 0.0007084 0.0008165 0.0009549
0.0011331 0.0013638 0.0016630 0.0020511 0.0025523 0.0031940 0.0040039 0.0050059
0.0062144 0.0076275 0.0092215 0.0109460 0.0127189 0.0144243 0.0159170 0.0170435
0.0176858 0.0178107 0.0174976 0.0169208 0.0162961 0.0158255 0.0156647 0.0159110
0.0165941 0.0176442 0.0188365 0.0197550 0.0198806 0.0188621 0.0167910 0.0141685
0.0115751 0.0093864 0.0077265 0.0065638 0.0058103 0.0053749 0.0051777 0.0051452
0.0051963 0.0052330 0.0051483 0.0048595 0.0043511 0.0036882 0.0029805 0.0023263
0.0017803 0.0013548 0.0010367 0.0008043 0.0006360 0.0005140 0.0004251 0.0003598
0.0003114 0.0002751 0.0002478 0.0002270 0.0002112 0.0001991 0.0001899 0.0001829
0.0001777 0.0001737 0.0001709 0.0001689 0.0001675 0.0001667 0.0001662 0.0001661
0.0001663 0.0001667 0.0001671
      14    0.17139       0.3609566E-01    23456                   8
0.0007748 0.0007798 0.0007903 0.0008056 0.0008264 0.0008534 0.0008880 0.0009318
0.0009870 0.0010568 0.0011452 0.0012580 0.0014030 0.0015911 0.0018372 0.0021620
0.0025937 0.0031696 0.0039376 0.0049536 0.0062734 0.0079334 0.0099173 0.0121152
0.0142997 0.0161590 0.0173997 0.0178738 0.0176353 0.0168908 0.0158921 0.0148491
0.0138978 0.0131072 0.0125025 0.0120858 0.0118488 0.0117780 0.0118539 0.0120460
0.0123056 0.0125605 0.0127193 0.0126889 0.0124070 0.0118704 0.0111402 0.0103164
0.0095007 0.0087684 0.0081591 0.0076794 0.0073095 0.0070089 0.0067214 0.0063849
0.0059480 0.0053908 0.0047356 0.0040373 0.0033589 0.0027486 0.0022309 0.0018094
0.0014750 0.0012137 0.0010110 0.0008539 0.0007320 0.0006372 0.0005632 0.0005053
0.0004600 0.0004245 0.0003968 0.0003753 0.0003588 0.0003463 0.0003368 0.0003299
```

Figure D1. (Sheet 3 of 6)

```
0.0003250 0.0003215 0.0003193 0.0003179 0.0003172 0.0003170 0.0003172 0.0003177
0.0003183 0.0003192 0.0003199
      15    0.18115        0.3732171E-01    23456                20
0.0008454 0.0008514 0.0008636 0.0008808 0.0009037 0.0009331 0.0009699 0.0010155
0.0010717 0.0011412 0.0012270 0.0013335 0.0014666 0.0016334 0.0018434 0.0021079
0.0024402 0.0028551 0.0033672 0.0039899 0.0047332 0.0056029 0.0065994 0.0077180
0.0089472 0.0102647 0.0116293 0.0129704 0.0141818 0.0151310 0.0156958 0.0158173
0.0155401 0.0150042 0.0143946 0.0138847 0.0136064 0.0136476 0.0140594 0.0148532
0.0159723 0.0172406 0.0183254 0.0187963 0.0183278 0.0169210 0.0149117 0.0127497
0.0107739 0.0091405 0.0078683 0.0069065 0.0061806 0.0056141 0.0051376 0.0046946
0.0042476 0.0037830 0.0033085 0.0028447 0.0024133 0.0020301 0.0017018 0.0014279
0.0012035 0.0010216 0.0008751 0.0007577 0.0006638 0.0005890 0.0005298 0.0004834
0.0004473 0.0004198 0.0003992 0.0003842 0.0003735 0.0003661 0.0003611 0.0003580
0.0003560 0.0003549 0.0003543 0.0003541 0.0003541 0.0003542 0.0003546 0.0003551
0.0003559 0.0003569 0.0003578
      16    0.19092        0.3747641E-01    2345                 30
0.0007170 0.0007229 0.0007352 0.0007532 0.0007773 0.0008087 0.0008483 0.0008978
0.0009594 0.0010361 0.0011318 0.0012521 0.0014046 0.0015999 0.0018530 0.0021846
0.0026236 0.0032097 0.0039945 0.0050412 0.0064162 0.0081676 0.0102837 0.0126387
0.0149552 0.0168375 0.0179076 0.0179831 0.0171664 0.0157757 0.0141847 0.0126927
0.0114808 0.0106326 0.0101743 0.0101086 0.0104325 0.0111400 0.0122101 0.0135818
0.0151212 0.0165979 0.0176982 0.0181015 0.0176035 0.0162193 0.0141891 0.0118742
0.0096162 0.0076433 0.0060529 0.0048447 0.0039675 0.0033540 0.0029412 0.0026771
0.0025210 0.0024412 0.0024121 0.0024115 0.0024200 0.0024205 0.0023995 0.0023479
0.0022621 0.0021438 0.0019993 0.0018378 0.0016691 0.0015022 0.0013442 0.0011997
0.0010711 0.0009592 0.0008634 0.0007823 0.0007143 0.0006576 0.0006106 0.0005719
0.0005399 0.0005138 0.0004926 0.0004755 0.0004619 0.0004514 0.0004436 0.0004382
0.0004351 0.0004340 0.0004345
      17    0.20068        0.3691613E-01    2345                 30
0.0012605 0.0012685 0.0012859 0.0013119 0.0013473 0.0013929 0.0014501 0.0015207
0.0016071 0.0017123 0.0018406 0.0019974 0.0021901 0.0024285 0.0027258 0.0030991
0.0035705 0.0041674 0.0049205 0.0058603 0.0070069 0.0083538 0.0098474 0.0113689
0.0127373 0.0137456 0.0142273 0.0141215 0.0134972 0.0125212 0.0113952 0.0102990
0.0093630 0.0086683 0.0082635 0.0081842 0.0084709 0.0091811 0.0103918 0.0121834
0.0145870 0.0174760 0.0204224 0.0226371 0.0232063 0.0216425 0.0183108 0.0142242
0.0103909 0.0073580 0.0052096 0.0037899 0.0028919 0.0023441 0.0020281 0.0018693
0.0018224 0.0018597 0.0019623 0.0021137 0.0022951 0.0024832 0.0026504 0.0027684
0.0028143 0.0027771 0.0026602 0.0024801 0.0022607 0.0020266 0.0017978 0.0015880
0.0014038 0.0012474 0.0011174 0.0010110 0.0009250 0.0008558 0.0008005 0.0007564
0.0007216 0.0006941 0.0006726 0.0006559 0.0006432 0.0006338 0.0006271 0.0006227
0.0006202 0.0006196 0.0006201
      18    0.21045        0.3092433E-01    2345                 30
0.0007666 0.0007743 0.0007906 0.0008148 0.0008480 0.0008917 0.0009480 0.0010198
0.0011108 0.0012260 0.0013721 0.0015576 0.0017934 0.0020929 0.0024721 0.0029477
0.0035348 0.0042407 0.0050569 0.0059500 0.0068560 0.0076864 0.0083490 0.0087796
0.0089674 0.0089606 0.0088482 0.0087329 0.0087082 0.0088495 0.0092137 0.0098409
0.0107523 0.0119390 0.0133451 0.0148538 0.0162952 0.0174875 0.0183038 0.0187251
0.0188432 0.0188090 0.0187584 0.0187484 0.0187178 0.0184810 0.0177770 0.0163921
0.0143126 0.0117871 0.0092152 0.0069461 0.0051537 0.0038445 0.0029356 0.0023238
0.0019203 0.0016602 0.0014988 0.0014066 0.0013631 0.0013535 0.0013654 0.0013875
0.0014088 0.0014193 0.0014110 0.0013789 0.0013226 0.0012453 0.0011530 0.0010531
0.0009522 0.0008556 0.0007670 0.0006881 0.0006195 0.0005610 0.0005116 0.0004704
0.0004363 0.0004083 0.0003854 0.0003670 0.0003523 0.0003408 0.0003322 0.0003260
0.0003222 0.0003205 0.0003204
      19    0.22021        0.2798828E-01    2345                 30
0.0007526 0.0007604 0.0007774 0.0008034 0.0008398 0.0008892 0.0009547 0.0010413
0.0011556 0.0013073 0.0015097 0.0017820 0.0021504 0.0026508 0.0033291 0.0042382
0.0054265 0.0069124 0.0086427 0.0104510 0.0120550 0.0131347 0.0134791 0.0131027
0.0122354 0.0111966 0.0102655 0.0096242 0.0093695 0.0095504 0.0101914 0.0112891
0.0127750 0.0144623 0.0160224 0.0170590 0.0172855 0.0166903 0.0155394 0.0142196
0.0130668 0.0122896 0.0119777 0.0121305 0.0126537 0.0133180 0.0137279 0.0134157
0.0121162 0.0100175 0.0076637 0.0055764 0.0039995 0.0029264 0.0022437 0.0018327
0.0016056 0.0015064 0.0015013 0.0015688 0.0016915 0.0018485 0.0020118 0.0021466
0.0022185 0.0022041 0.0020997 0.0019222 0.0017007 0.0014660 0.0012423 0.0010440
0.0008769 0.0007408 0.0006326 0.0005477 0.0004818 0.0004309 0.0003918 0.0003620
0.0003394 0.0003224 0.0003098 0.0003007 0.0002942 0.0002897 0.0002869 0.0002852
0.0002845 0.0002845 0.0002849
      20    0.22998        0.2522676E-01    2345                 30
0.0021804 0.0021901 0.0021971 0.0021972 0.0021912 0.0021804 0.0021667 0.0021531
0.0021433 0.0021426 0.0021578 0.0021975 0.0022731 0.0024000 0.0025987 0.0028979
0.0033379 0.0039747 0.0048839 0.0061591 0.0078979 0.0101600 0.0128883 0.0158101
0.0183986 0.0200147 0.0202336 0.0191253 0.0172108 0.0151365 0.0133788 0.0121629
```

Figure D1. (Sheet 4 of 6)

```
0.0115342 0.0114517 0.0118383 0.0125869 0.0135420 0.0144827 0.0151416 0.0152788
0.0147906 0.0137768 0.0124985 0.0112492 0.0102361 0.0095331 0.0090946 0.0087865
0.0084250 0.0078343 0.0069254 0.0057513 0.0044836 0.0033178 0.0023801 0.0017006
0.0012445 0.0009551 0.0007805 0.0006834 0.0006393 0.0006332 0.0006559 0.0007007
0.0007619 0.0008334 0.0009080 0.0009780 0.0010358 0.0010750 0.0010918 0.0010855
0.0010584 0.0010152 0.0009614 0.0009025 0.0008432 0.0007870 0.0007360 0.0006913
0.0006531 0.0006214 0.0005955 0.0005749 0.0005588 0.0005467 0.0005379 0.0005321
0.0005289 0.0005280 0.0005287
      21    0.23975        0.2621384E-01    2345                          8
0.0036853 0.0037165 0.0037786 0.0038668 0.0039835 0.0041318 0.0043157 0.0045402
0.0048113 0.0051359 0.0055211 0.0059734 0.0064964 0.0070873 0.0077332 0.0084071
0.0090666 0.0096596 0.0101352 0.0104583 0.0106197 0.0106378 0.0105507 0.0104049
0.0102444 0.0101045 0.0100081 0.0099654 0.0099732 0.0100154 0.0100656 0.0100930
0.0100722 0.0099940 0.0098711 0.0097364 0.0096353 0.0096169 0.0097273 0.0100049
0.0104723 0.0111198 0.0118739 0.0125658 0.0129411 0.0127576 0.0119368 0.0106247
0.0090938 0.0075924 0.0062670 0.0051700 0.0042976 0.0036218 0.0031088 0.0027255
0.0024419 0.0022317 0.0020720 0.0019448 0.0018364 0.0017381 0.0016444 0.0015531
0.0014632 0.0013749 0.0012891 0.0012068 0.0011293 0.0010577 0.0009934 0.0009377
0.0008915 0.0008552 0.0008290 0.0008125 0.0008048 0.0008049 0.0008113 0.0008227
0.0008377 0.0008549 0.0008733 0.0008918 0.0009096 0.0009261 0.0009407 0.0009531
0.0009629 0.0009700 0.0009736
      22    0.24951        0.2478462E-01    2345                         30
0.0054159 0.0054478 0.0054979 0.0055571 0.0056253 0.0057027 0.0057898 0.0058875
0.0059978 0.0061243 0.0062726 0.0064511 0.0066715 0.0069479 0.0072956 0.0077286
0.0082572 0.0088868 0.0096199 0.0104593 0.0114108 0.0124831 0.0136776 0.0149692
0.0162741 0.0174155 0.0181170 0.0180717 0.0171008 0.0153047 0.0130487 0.0107714
0.0087903 0.0072414 0.0061317 0.0054149 0.0050454 0.0050063 0.0053230 0.0060646
0.0073147 0.0090655 0.0110281 0.0125574 0.0129907 0.0121739 0.0105184 0.0085893
0.0067764 0.0052471 0.0040314 0.0031008 0.0024096 0.0019098 0.0015566 0.0013104
0.0011394 0.0010193 0.0009335 0.0008707 0.0008241 0.0007893 0.0007636 0.0007453
0.0007331 0.0007263 0.0007243 0.0007265 0.0007327 0.0007419 0.0007533 0.0007658
0.0007780 0.0007889 0.0007977 0.0008039 0.0008075 0.0008087 0.0008080 0.0008059
0.0008028 0.0007992 0.0007955 0.0007919 0.0007887 0.0007860 0.0007839 0.0007825
0.0007818 0.0007818 0.0007823
      23    0.25928        0.2403465E-01    2345                         30
0.0056538 0.0057472 0.0059246 0.0061702 0.0064902 0.0068907 0.0073760 0.0079454
0.0085882 0.0092773 0.0099644 0.0105797 0.0110438 0.0112924 0.0113062 0.0111273
0.0108495 0.0105918 0.0104725 0.0105984 0.0110689 0.0119823 0.0134268 0.0154255
0.0178056 0.0200206 0.0211541 0.0204145 0.0178521 0.0143903 0.0110652 0.0084333
0.0065822 0.0053884 0.0047028 0.0044239 0.0045111 0.0049720 0.0058107 0.0069114
0.0079237 0.0083954 0.0081543 0.0074338 0.0065897 0.0058471 0.0052715 0.0048321
0.0044535 0.0040520 0.0035739 0.0030275 0.0024753 0.0019868 0.0015991 0.0013141
0.0011151 0.0009823 0.0008987 0.0008518 0.0008323 0.0008324 0.0008446 0.0008604
0.0008708 0.0008679 0.0008472 0.0008091 0.0007582 0.0007008 0.0006428 0.0005886
0.0005402 0.0004985 0.0004634 0.0004343 0.0004106 0.0003914 0.0003762 0.0003641
0.0003549 0.0003478 0.0003427 0.0003390 0.0003365 0.0003350 0.0003342 0.0003340
0.0003342 0.0003348 0.0003354
      24    0.26904        0.2466168E-01    2345                         30
0.0053254 0.0054156 0.0056067 0.0058929 0.0062911 0.0068249 0.0075246 0.0084259
0.0095636 0.0109563 0.0125780 0.0143183 0.0159561 0.0171920 0.0177697 0.0176217
0.0169161 0.0159607 0.0150615 0.0144424 0.0142374 0.0145104 0.0152534 0.0163364
0.0174228 0.0179559 0.0173856 0.0155787 0.0129758 0.0102581 0.0079188 0.0061353
0.0048794 0.0040546 0.0035745 0.0033924 0.0035079 0.0039526 0.0047264 0.0056779
0.0064626 0.0067510 0.0064835 0.0058384 0.0050299 0.0041976 0.0034122 0.0027133
0.0021292 0.0016744 0.0013445 0.0011198 0.0009768 0.0008956 0.0008634 0.0008737
0.0009246 0.0010157 0.0011429 0.0012903 0.0014227 0.0014920 0.0014636 0.0013417
0.0011643 0.0009756 0.0008049 0.0006638 0.0005528 0.0004675 0.0004029 0.0003546
0.0003189 0.0002933 0.0002760 0.0002657 0.0002613 0.0002619 0.0002669 0.0002752
0.0002862 0.0002988 0.0003122 0.0003257 0.0003386 0.0003504 0.0003606 0.0003692
0.0003759 0.0003806 0.0003829
      25    0.27881        0.2358821E-01    2345                         30
0.0074572 0.0075841 0.0078281 0.0081654 0.0085966 0.0091161 0.0097066 0.0103326
0.0109354 0.0114357 0.0117487 0.0118155 0.0116359 0.0112801 0.0108680 0.0105312
0.0103855 0.0105266 0.0110414 0.0120218 0.0135609 0.0157107 0.0183642 0.0210768
0.0230027 0.0232716 0.0216933 0.0189637 0.0160554 0.0135929 0.0117513 0.0104362
0.0094389 0.0085145 0.0074577 0.0062185 0.0049519 0.0038840 0.0031302 0.0026713
0.0024341 0.0023472 0.0023474 0.0023682 0.0023361 0.0021970 0.0019555 0.0016739
0.0014211 0.0012332 0.0011157 0.0010611 0.0010601 0.0011045 0.0011839 0.0012801
0.0013620 0.0013915 0.0013440 0.0012281 0.0010793 0.0009328 0.0008074 0.0007070
0.0006279 0.0005645 0.0005118 0.0004662 0.0004256 0.0003894 0.0003577 0.0003311
0.0003101 0.0002948 0.0002847 0.0002793 0.0002776 0.0002787 0.0002818 0.0002860
0.0002910 0.0002961 0.0003010 0.0003056 0.0003097 0.0003133 0.0003163 0.0003187
0.0003206 0.0003220 0.0003227
```

Figure D1. (Sheet 5 of 6)

```
      26   0.28857       0.2551419E-01    2345                    30
0.0063663 0.0064352 0.0065773 0.0067890 0.0070875 0.0074999 0.0080681 0.0088558
0.0099570 0.0115037 0.0136570 0.0165510 0.0201426 0.0239869 0.0271623 0.0286623
0.0280866 0.0259065 0.0230444 0.0203118 0.0181660 0.0167362 0.0159070 0.0153690
0.0146902 0.0134966 0.0116910 0.0094966 0.0072747 0.0053146 0.0037554 0.0026169
0.0018592 0.0014275 0.0012810 0.0014105 0.0018177 0.0024146 0.0029467 0.0031321
0.0028926 0.0023754 0.0018021 0.0013406 0.0010653 0.0009779 0.0010428 0.0012041
0.0013959 0.0015642 0.0016842 0.0017576 0.0017996 0.0018274 0.0018497 0.0018530
0.0018005 0.0016613 0.0014454 0.0011970 0.0009606 0.0007613 0.0006063 0.0004934
0.0004169 0.0003706 0.0003491 0.0003467 0.0003572 0.0003732 0.0003869 0.0003926
0.0003881 0.0003749 0.0003565 0.0003368 0.0003189 0.0003046 0.0002947 0.0002890
0.0002870 0.0002881 0.0002915 0.0002963 0.0003019 0.0003075 0.0003128 0.0003172
0.0003205 0.0003224 0.0003230
      27   0.29834       0.2407840E-01    2345                    30
0.0110818 0.0111424 0.0112592 0.0114204 0.0116301 0.0118968 0.0122366 0.0126774
0.0132637 0.0140562 0.0151188 0.0164801 0.0180725 0.0196895 0.0210247 0.0218023
0.0219031 0.0213853 0.0204065 0.0191325 0.0176835 0.0161248 0.0144838 0.0127830
0.0110708 0.0094251 0.0079250 0.0066185 0.0055146 0.0045969 0.0038470 0.0032645
0.0028746 0.0027108 0.0027706 0.0029703 0.0031563 0.0031918 0.0030265 0.0026837
0.0022232 0.0017272 0.0012906 0.0009864 0.0008336 0.0008074 0.0008696 0.0009918
0.0011667 0.0014123 0.0017702 0.0022872 0.0029458 0.0035573 0.0038146 0.0035815
0.0030117 0.0023463 0.0017406 0.0012543 0.0008957 0.0006518 0.0005010 0.0004194
0.0003854 0.0003805 0.0003894 0.0004000 0.0004047 0.0004004 0.0003883 0.0003715
0.0003536 0.0003375 0.0003249 0.0003164 0.0003120 0.0003112 0.0003131 0.0003172
0.0003227 0.0003290 0.0003357 0.0003424 0.0003488 0.0003545 0.0003594 0.0003632
0.0003659 0.0003672 0.0003673
      28   0.30811       0.2010743E-01    2345                    30
0.0072975 0.0073736 0.0075257 0.0077454 0.0080454 0.0084444 0.0089691 0.0096548
0.0105453 0.0116871 0.0131143 0.0148196 0.0167177 0.0186300 0.0203239 0.0216054
0.0223989 0.0227477 0.0227350 0.0223860 0.0216103 0.0202346 0.0181464 0.0154658
0.0125608 0.0098535 0.0076155 0.0059210 0.0047226 0.0039409 0.0035203 0.0034564
0.0037981 0.0045899 0.0057014 0.0066877 0.0070329 0.0065841 0.0055819 0.0043818
0.0032698 0.0024113 0.0018486 0.0015356 0.0013975 0.0013747 0.0014341 0.0015609
0.0017358 0.0019007 0.0019479 0.0018002 0.0015020 0.0011691 0.0008821 0.0006643
0.0005098 0.0004067 0.0003463 0.0003246 0.0003413 0.0003957 0.0004789 0.0005691
0.0006392 0.0006730 0.0006724 0.0006501 0.0006201 0.0005921 0.0005708 0.0005577
0.0005525 0.0005541 0.0005615 0.0005736 0.0005897 0.0006093 0.0006317 0.0006566
0.0006832 0.0007109 0.0007389 0.0007663 0.0007921 0.0008154 0.0008355 0.0008516
0.0008633 0.0008703 0.0008724
      29   0.31787       0.1915942E-01    2345                    30
0.0086934 0.0087123 0.0087463 0.0087964 0.0088748 0.0090029 0.0092161 0.0095693
0.0101431 0.0110446 0.0123939 0.0142758 0.0166405 0.0191827 0.0213200 0.0224003
0.0220566 0.0204152 0.0179844 0.0153629 0.0130063 0.0111464 0.0098260 0.0089700
0.0084486 0.0081176 0.0078464 0.0075404 0.0071649 0.0067694 0.0064880 0.0064618
0.0066701 0.0068197 0.0065335 0.0056961 0.0045129 0.0032965 0.0022937 0.0016312
0.0013317 0.0013678 0.0016785 0.0020953 0.0023460 0.0022658 0.0019493 0.0016432
0.0015616 0.0018354 0.0025344 0.0036091 0.0048196 0.0058084 0.0062585 0.0060298
0.0052386 0.0041956 0.0031990 0.0023905 0.0017845 0.0013503 0.0010546 0.0008692
0.0007711 0.0007414 0.0007626 0.0008166 0.0008818 0.0009361 0.0009619 0.0009511
0.0009057 0.0008359 0.0007557 0.0006784 0.0006143 0.0005694 0.0005466 0.0005460
0.0005666 0.0006063 0.0006619 0.0007294 0.0008035 0.0008787 0.0009490 0.0010091
0.0010543 0.0010814 0.0010892
```

Figure D1. (Sheet 6 of 6)

# Appendix E
# Notation

| Text | Appendix C | |
|---|---|---|
| | datetime | Ten-character string that contains date and time |
| | dbar | Mean water depth |
| | dmax | Maximum segment-averaged water depth in a collection |
| | dmin | Minimum segment-averaged water depth in a collection |
| $df$ | delfs | Frequency increment |
| | d6b | Vector-averaged mean wind direction at building anemometer |
| | d6s | Measure of variability of wind direction at building anemometer |
| | d9b | Vector-averaged mean wind direction at pier-end anemometer |
| | d9s | Measure of variability of wind direction at pier-end anemometer |
| $d\theta$ | odelang | Direction increment |
| $D(f_n, \theta_m)$ | | Directional distribution function at frequency $f_n$ and direction $\theta_m$ |
| $E_i$ | | Incident wave energy |
| $E_r$ | | Reflected wave energy |

| Text | Appendix C | |
|---|---|---|
| $f$ | | Frequency |
| $f_n$ | | $n^{th}$ frequency of a set of $N$ discrete frequencies |
| $f_p$ | | Peak frequency |
| | `fp` | Frequency at peak of frequency spectrum |
| $f_{p,FD}$ | | Frequency at peak of frequency-direction spectrum |
| $f_{p,IFS}$ | | Frequency at peak of integrated frequency spectrum |
| $g$ | | Gravitational acceleration |
| *hhmm* | | Mnemonic for time of day |
| $H_{mo}$ | `Hmo` | Characteristic wave height |
| $H_{mo,i}$ | | Characteristic incident wave height |
| $H_{mo,r}$ | | Characteristic reflected wave height |
| | `idgfr` | Degrees of freedom in cross-spectral estimation |
| | `ifdtrnd` | Flag indicating whether or not data have been detrended |
| | `ifimle` | Flag indicating if maximum likelihood or iterative maximum likelihood estimation is used |
| | `ifwindo` | Flag indicating whether or not data segments have been windowed |
| | `istot` | Total number of seconds duration of a time series |
| | `itero(nof)` | Number of iterative maximum likelihood iterations used to compute directional distribution at frequency `of(nof)` |
| $I(f_n, \theta_j)$ | | Cumulative distribution function at frequency $f_n$ and direction $\theta_m$ |

| Text | Appendix C | |
|---|---|---|
| $j$ | | Index associated with discrete direction |
| $m$ | noa | Index associated with discrete direction |
| $M$ | noang | Integer number of discrete directions |
| $n$ | nof | Index associated with discrete frequency |
| | nband | Number of frequency bands averaged in spectral estimation |
| | nensb | Number of segments into which a data record is divided during spectral estimation |
| | nfft | Number of data points in a data segment |
| $N$ | nofrq | Integer number of discrete frequencies |
| | oangle(noa) | Element noa of an array that represents direction coordinates |
| | of(nof) | Element nof of an array that represents frequency |
| | ogpat(nof) | Element nof of an array of 16-character strings that represent the working gauge pattern |
| | osf(nof) | Element nof of an array that represents the frequency spectrum |
| | ospc(nof,noa) | Array element representing the directional distribution function at frequency of(nof) and direction oangle(noa) |
| | rname | Four-character string denoting reference gauge |
| | sfrq | Sampling frequency |
| | s6b | Mean wind speed at building anemometer |
| | s6m | Maximum wind speed at building anemometer |
| | s6s | Standard deviation of wind speed at building anemometer |
| | s9b | Mean wind speed at pier-end anemometer |

| Text | Appendix C | |
|---|---|---|
| | s9m | Maximum wind speed at pier-end anemometer |
| | s9s | Standard deviation of wind speed at pier-end anemometer |
| $S(f)$ | | Frequency spectrum |
| $S(f_n)$ | | Integrated frequency spectral density at frequency $f_n$ |
| $S(\theta_m)$ | | Integrated direction spectral density at direction $\theta_m$ |
| $S(f_n, \theta_m)$ | | Frequency-direction spectral density at frequency $f_n$ and direction $\theta_m$ |
| $S_{\min}(f_n)$ | | Minimum of $S(f_n, \theta_m)$ at frequency $f_n$ |
| | thp | Peak direction of directional distribution at frequency fp |
| $T_p$ | | Spectral peak period |
| $T_{p,FD}$ | | Spectral peak period from the frequency at which the frequency-direction spectrum is a maximum |
| $T_{p,IFS}$ | | Peak period from the integrated frequency spectrum |
| $w_m$ | | $m^{th}$ of a set of $M$ weights used in the computation of incident and reflected energy |
| *yymmdd* | | Mnemonic for date |
| $\Delta\theta$ | | Directional spread parameter |
| $\Delta\theta_n$ | | Directional spread parameter of a 180-deg directional distribution at frequency $f_n$ |
| $\Delta\theta_{FDP}$ | | Directional spread parameter of the directional distribution at the peak frequency of a frequency-direction spectrum |

| Text | Appendix C | |
|---|---|---|
| $\Delta\theta_{IDS}$ | | Directional spread parameter of integrated direction spectrum |
| $\Delta\theta_{SW}$ | | Spectrally weighted directional spread parameter |
| $\theta_j$ | | $j^{th}$ direction of a set of $M$ discrete directions |
| $\theta_m$ | | $m^{th}$ direction of a set of $M$ discrete directions |
| $\theta_p$ | | Peak direction |
| $\theta_{p,n}$ | | Direction of peak in directional distribution function at frequency $f_n$ |
| $\theta_{p,FD}$ | | Direction at peak of frequency-direction spectrum |
| $\theta_{p,IDS}$ | | Direction at peak of integrated direction spectrum |
| $\theta_{p,SW}$ | | Spectrally weighted peak direction |
| $\theta_{25\%,n}$ | | Direction at which cumulative distribution function equals 0.25 at frequency $f_n$ |
| $\theta_{50\%,n}$ | | Direction at which cumulative distribution function equals 0.50 at frequency $f_n$ |
| $\theta_{75\%,n}$ | | Direction at which cumulative distribution function equals 0.75 at frequency $f_n$ |
| $\rho$ | | Water density |
| $\chi$ | | Reflection coefficient |

# REPORT DOCUMENTATION PAGE

*Form Approved*
*OMB No. 0704-0188*



| 1. AGENCY USE ONLY *(Leave blank)* | 2. REPORT DATE | 3. REPORT TYPE AND DATES COVERED |
|---|---|---|
| | June 1995 | Final report |

**4. TITLE AND SUBTITLE**
Index and Bulk Parameters for Frequency-Direction Spectra Measured at CERC Field Research Facility, September 1993 to May 1994

**5. FUNDING NUMBERS**

**6. AUTHOR(S)**
Charles E. Long, Judy H. Roughton

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**
U.S. Army Engineer Waterways Experiment Station
3909 Halls Ferry Road, Vicksburg, MS 39180-6199

**8. PERFORMING ORGANIZATION REPORT NUMBER**
Miscellaneous Paper
CERC-95-5

**9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)**
U.S. Army Corps of Engineers
Washington, DC 20314-1000

**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**

**11. SUPPLEMENTARY NOTES**
Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

**12a. DISTRIBUTION/AVAILABILITY STATEMENT**
Approved for public release; distribution is unlimited.

**12b. DISTRIBUTION CODE**

**13. ABSTRACT** *(Maximum 200 words)*

This report indexes parameters of and describes a means of access to 1.975 wind wave frequency-direction spectral observations obtained at the U.S. Army Engineer Waterways Experiment Station Field Research Facility from September 1993 to May 1994. An iterative maximum likelihood algorithm is used to estimate directional spectra using signals from a spatial array of 16 bottom-mounted pressure sensors in about 8 m of water, approximately 900 m offshore. Parameters include characteristic wave height, spectral peak frequency and corresponding peak period, peak wave direction, directional spread, and reflection coefficient. Time series graphs of these parameters, as well as local winds and currents, illustrate the salient climatology.

**14. SUBJECT TERMS**
Frequency-direction spectra
Wave climate
Wave database
Wind waves

**15. NUMBER OF PAGES**
97

**16. PRICE CODE**

| 17. SECURITY CLASSIFICATION OF REPORT | 18. SECURITY CLASSIFICATION OF THIS PAGE | 19. SECURITY CLASSIFICATION OF ABSTRACT | 20. LIMITATION OF ABSTRACT |
|---|---|---|---|
| UNCLASSIFIED | UNCLASSIFIED | | |